PRELIMINARY HYDROLOGY CALCULATIONS

FOR

BRIDGE UPLAND

NORTHEAST CORNER OF FOOTHILL BLVD.
AND CENTRAL AVENUE
UPLAND, CALIFORNIA
PREPARED FOR

BRIDGE DEVELOPMENT PARTNERS

1334 PARKWAY AVENUE, SUITE 310 MANHATTAN BEACH, CALIFORNIA 90266 P. (213) 805-6350 FAX (310) 853-8423

MAY 7, 2018
REVISED APRIL 3, 2019
REVISED JULY 22, 2019
REVISED SEPTEMBER 27, 2019
REVISED NOVEMBER 13, 2019
REVISED NOVEMBER 22, 2019
REVISED JANUARY 21, 2020
REVISED JANARUY 24, 2020

JOB NO. 3651

PREPARED BY

THIENES ENGINEERING 14349 FIRESTONE BLVD. LA MIRADA, CALIFORNIA 90638 P. (714) 521-4811 FAX (714) 521-4173

PRELIMINARY HYDROLOGY CALCULATIONS

FOR

BRIDGE UPLAND

PREPARED UNDER THE SUPERVISION OF

REINHARD STENZEL

1/24/2020

DATE:

R.C.E. 56155

EXP. 12/31/2020

INTRODUCTION

A: PROJECT LOCATION

The project site is located north of Foothill Boulevard between the prolongation of Central Avenue at the west and Benson Avenue to the east in the City of Upland. Cable Airport is adjacent to the site to the north. See following page for vicinity map.

B: STUDY PURPOSE

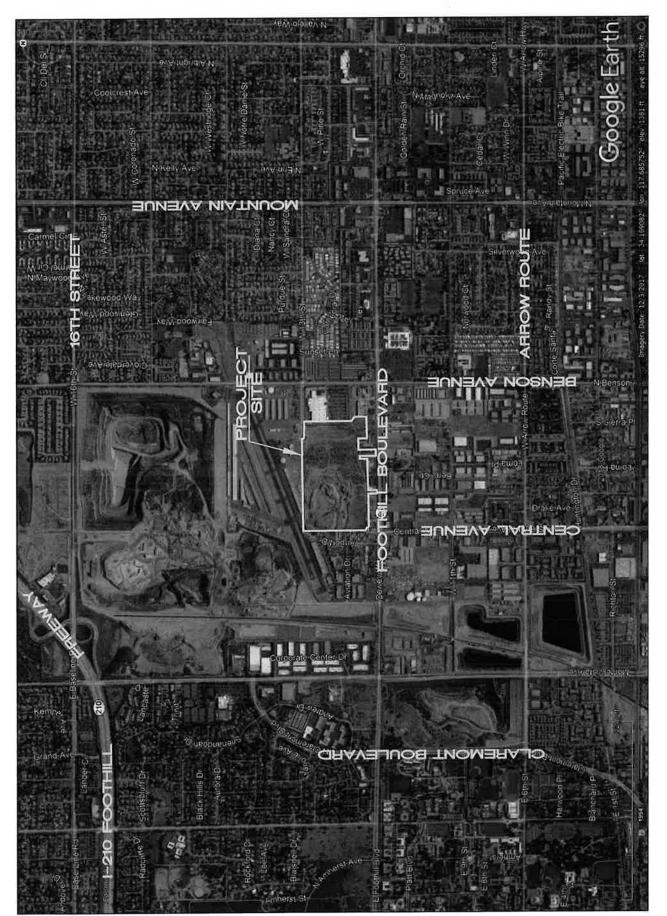
The purpose of this study is to determine the existing and proposed condition 100-year peak flow rate from the site that ultimately drains to an existing storm drain system in Foothill Boulevard.

C: PROJECT STAFF:

Thienes Engineering staff involved in this study include:

Reinhard Stenzel, PE James Wickenhaeuser





VICINITY MAP

BRIDGE UPLAND

DISCUSSION

The proposed commercial site encompasses approximately 50.25 acres. Improvements to the site include one warehouse type building. The building is approximately 201,096 square feet. The building has two truck yard areas as well as vehicle parking. Landscaping is located throughout the project site.

County/City Hydrology

San Bernardino County Flood Control District's Comprehensive Storm Drain Plan Project No. 1-7, dated July 1966, appears to have tabled the easterly half of the project site (Area B9) to a storm drain system in Benson Avenue. The westerly half of the project site (southerly portion of Area 7A) appears to be tabled to a future storm drain system in Central Avenue. This study also shows a portion of the airport to the north (northerly portion of Area 7A) draining to the project site. The provided drainage maps to not indicate peak flow rates.

The West Upland Master Storm Drain Plan appears to have updated the older Comprehensive Storm Drain Plan. Exhibit "A" – Hydrology Map, dated June 2001, provided by the City shows the majority of the project site (Areas B6, B7, B10, B11 and B12) tabled westerly in Foothill Boulevard to detention areas located south of Foothill Boulevard and east of San Antonio Channel. This exhibit does not indicate peak flow rates.

See Appendix "A" for reference County and City hydrology plans.

Existing Storm Drain Facilities

There is an existing storm drain system in Benson Avenue. The upstream portion of this storm drain is at the intersection of Benson Avenue and 13th Street (east) and Cable Airport Drive (west). The drain continues southerly in Benson Avenue to Arrow Highway. Here, the drain continues westerly in Arrow Highway ultimately to Arrow Highway Basin located between Arrow Highway and Huntington Drive east of San Antonio Creek Channel. Hydrology for this storm drain system was not available from the City. It does not appear that a significant portion of the project site is tabled to the Benson Avenue storm drain system.

There is a 42" lateral to the Benson Avenue storm drain at the northerly side of Foothill Boulevard. However, this drain appears to serve the existing Lowe's site and other commercial sites located to the east of the project site.

There is an existing storm drain in 11th Street located south of Foothill Boulevard. This drain intercepts runoff from the upstream portion of the Benson Avenue storm drain, thus providing relief to downstream portions. The storm drain continues westerly to Dewey Way. While this storm drain shows an increase in peak flow rate at Central Avenue, it does not appear that this drain was intended for flows tabled to Central Avenue from Comprehensive Storm Drain Plan Project No. 1-7.

There is an existing storm drain system in Dewey Way. This storm drain traverses southerly from Foothill Boulevard to an existing Arrow Highway basin located south of Arrow Highway. Dewey Way is approximately 1250' west of the project site. The plans show a 72" lateral in Foothill Boulevard that extends about 400' easterly. The hydrology study or drainage maps to this storm drain were not available from the City. However, based on the Master Plan and peak flow rates shown on the plan it appears that the project site is tabled to the 72" Foothill lateral.

Finally, the Cable Airport to the north appears to have an onsite drainage system. The majority of runoff from the airport is conveyed westerly to a storm drain system that continues southerly and connected to the previously mentioned Dewey Way storm drain system. It does not appear that the Airport drains directly to the project site.

See Appendix "A" for reference storm drain facilities.

Existing Condition Hydrology

The project site is currently an undeveloped dirt lot with native vegetation. There are several stockpiles of dirt/rocks on the westerly portion of the project site. There are several existing commercial developments and open areas south of the project site.

Foothill Boulevard has a high point roughly midway between the east and west boundaries of the site. Runoff from approximately half of the site ultimately drains easterly towards Benson Avenue with the other half draining westerly towards Central Avenue.

Runoff from the site generally drains from north to south towards Foothill Boulevard. While there are several large stockpiles of dirt on the site. It is assumed that runoff generally goes around these stockpiles and therefore elevations in the rational method model assume the stockpiles are just part of the overall area that is considered as barren.

The easterly portion of the site (nodes 100-102 and 200-202 on the existing condition hydrology map) ultimately drains to Foothill Boulevard through the adjacent properties and open spaces to the south. These areas then appear to drain easterly in Foothill Boulevard. The 100-year peak flow rate for these area is approximately 21.2 cfs and 23.6 cfs, respectively.

The stockpiles and areas adjacent (nodes 300-303 and 400-402) drain from north to south ultimately to Foothill Boulevard. It appears these flows continue westerly in the street. The respective 100-year peak flow rates are approximately 53.6 cfs and 47.6 cfs. Adding up the individual existing condition peak flow rates yields a total 100-year peak flow rate of 146.0 cfs.

See Appendix "B" for existing condition hydrology calculations.

Proposed Condition

Runoff from the easterly parking lot (nodes 100-104 on proposed condition hydrology map) will generally drain from north to south to catch basins located in the parking areas. A proposed storm drain, Line "B", will convey runoff southerly through the drive aisle. This flow will combine with the runoff from the southeasterly parking area (nodes 110-112) at node 113. These flows continue westerly in Line "A" through the southerly parking lot.

Flow from the southerly half of the proposed building and the southerly truck yard area (nodes 120-121) will be intercepted in catch basin located in the truck yard area. A storm drain conveys runoff southerly to confluence with Line "A" (at node 122). Continuing westerly, a portion of the southerly parking area is then added to the Line "A" storm drain system (at node 123). Line "A" continues westerly, ultimately connecting to Line "C" (at node 303).

Runoff from the northerly parking area, the northerly half of the proposed building and the northerly truck yard area (nodes 200-202) drain to catch basins located in the truck yard area. A proposed storm drain, Line "C", conveys runoff westerly around the proposed building. Parking areas immediately west of the building (nodes 203-204) are also tributary to Line "C". Line "C" continues westerly then southerly at the westerly drive aisle. The northwesterly parking area (nodes 300-301) is conveyed to Line "C" at this location (at node 302).

Line "C" continues southerly and confluences with Line "A" in the westerly drive aisle. The westerly drive aisle, the southwesterly parking area and a portion of the southerly landscaped area is added to this storm drain system (at nodes 304 and 305).

The total 100-year peak flow rate for this portion of the project site (nodes 100-305, 47.55 ac) is approximately 173.7 cfs.

The private storm drain system will connect to the proposed extension of the Foothill storm drain system at the Central Avenue cul-de-sac. This storm drain continues westerly in Foothill Boulevard, ultimately connecting to the existing 72" existing storm drain approximately 250' west of the project site.

The existing downstream storm drain plan indicates a 100-year peak flow rate of 288.4 cfs. The existing commercial development at the northeast corner of Dewey Way and Foothill Boulevard does not use this drain. It appears that the 72" storm drain has the capacity of the proposed development along with remaining areas on Foothill Boulevard.

Flow from the proposed easterly driveways (nodes 400-401, 0.25 ac. and 500-501, 0.70 ac) will sheet flow to Foothill Boulevard. The 100-year peak flow rates for these areas are approximately 1.5 cfs and 4.2 cfs, respectively.

The landscaped areas at the southerly portion of the project site (1.35 ac.) will continue to flow southerly to the existing commercial developments as under existing conditions. The 100-year peak flow rates for this area is approximately 7.6 cfs.

The landscaped areas at the northeastern portion of the project site (0.35 ac.) will continue to flow easterly to the existing commercial development as under existing conditions. The 100-year peak flow rates for this area is approximately 2.0 cfs.

Therefore the total 100-year peak flow rate for the project site (50.25 ac) is approximately 188.9 cfs.

See Appendix "B" for proposed condition hydrology calculations.

Water Quality

Roof and surface runoff will sheet flow into inlets where stormwater will be intercepted and diverted into the perforated CMPs for water quality treatment. This system will utilize infiltration as their primary form of treatment. This system stores stormwater runoff until it gradually exfiltrates into the underlying soil. Pollutant removal occurs through the infiltration of runoff and the adsorption of pollutants into the soil. This practice has high pollutant removal efficiency and can also help recharge groundwater, thus helping to maintain low flows in stream systems.

<u>Methodology</u>

San Bernardino County Rational Method program (by AES Software) was used for the hydrology calculations. The 1-hour rainfall value is 1.55 per the San Bernardino County Hydrology Manual. The soil type is "A". See Appendix "A" for reference material from the Hydrology Manual.

Summary

The total proposed 100-year peak flow from the project site is approximately 188.9 cfs (173.7cfs at the westerly storm drain system + 5.7 cfs at the easterly driveways + 9.6 from the landscape buffers). The existing public storm drain in Foothill Boulevard is designed for a 100-year storm event and indicates a peak flow rate of 288.4 cfs. This leaves approximately 100 cfs for the smaller remaining developments at Foothill Boulevard. Therefore, the proposed project site does not have an adverse effect on existing downstream facilities.

APPENDIX

DESCRIPTION

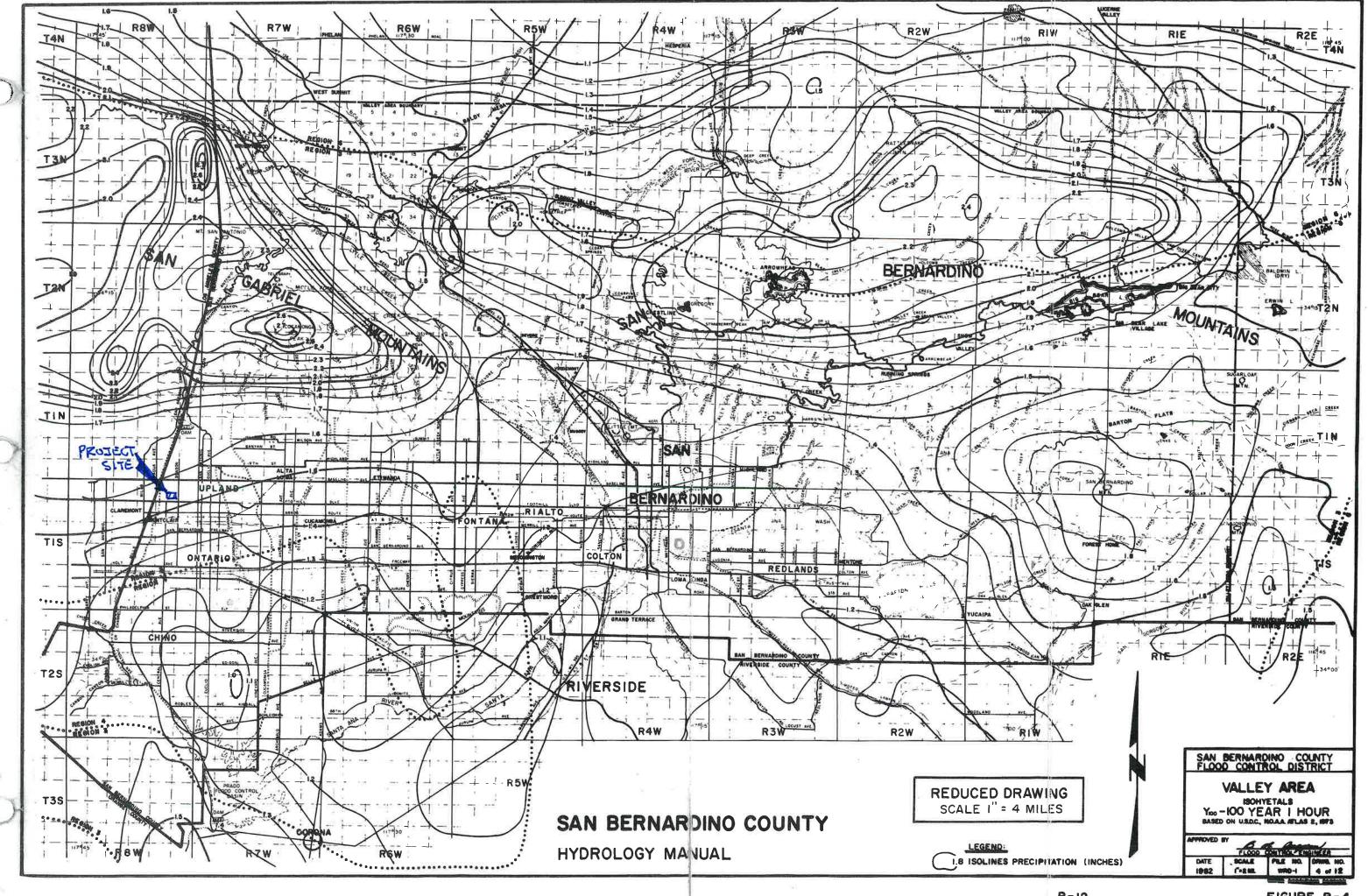
A REFERENCE MATERIALS

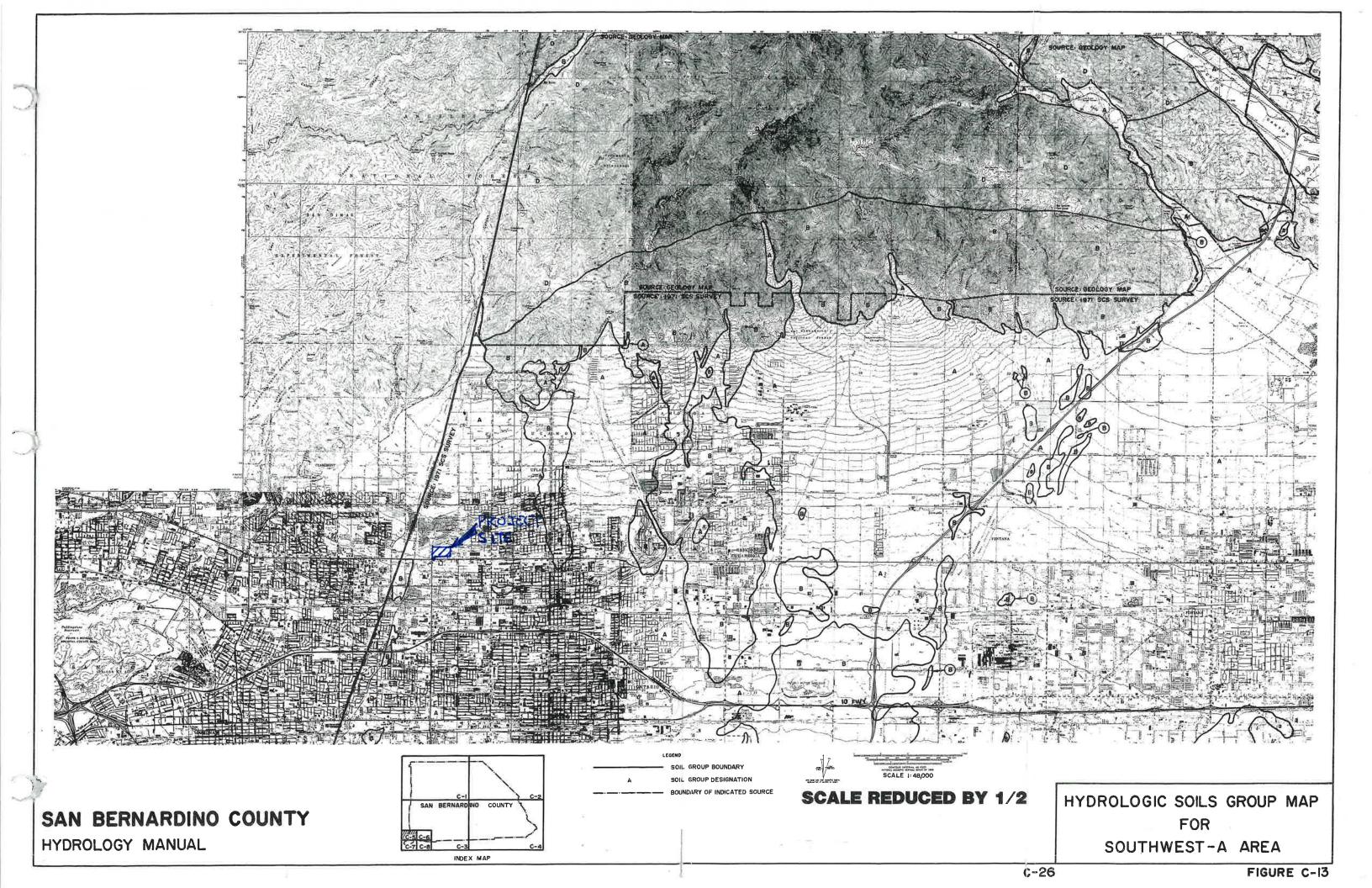
B HYDROLOGY CALCULATIONS

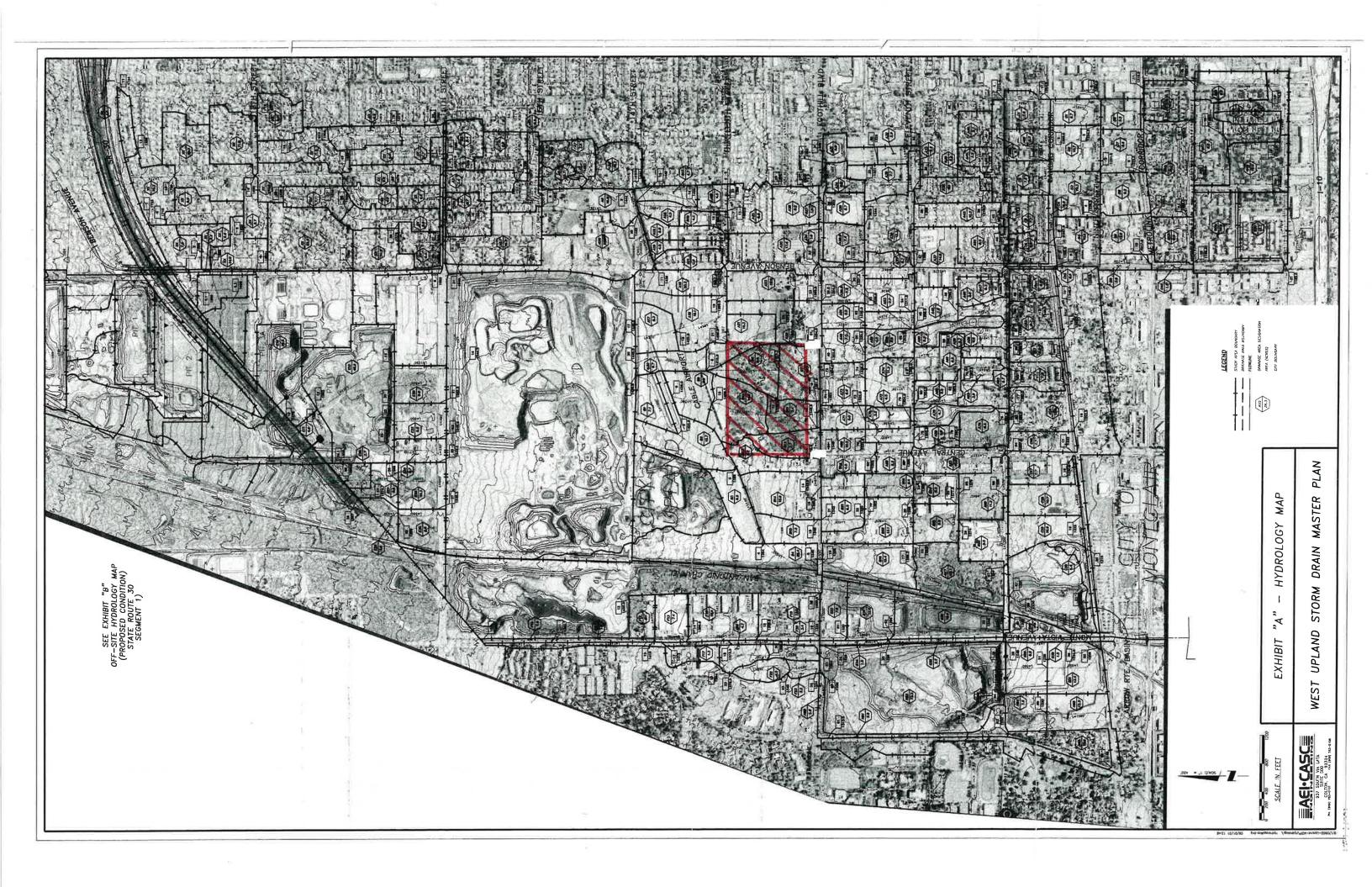
C HYDROLOGY MAP

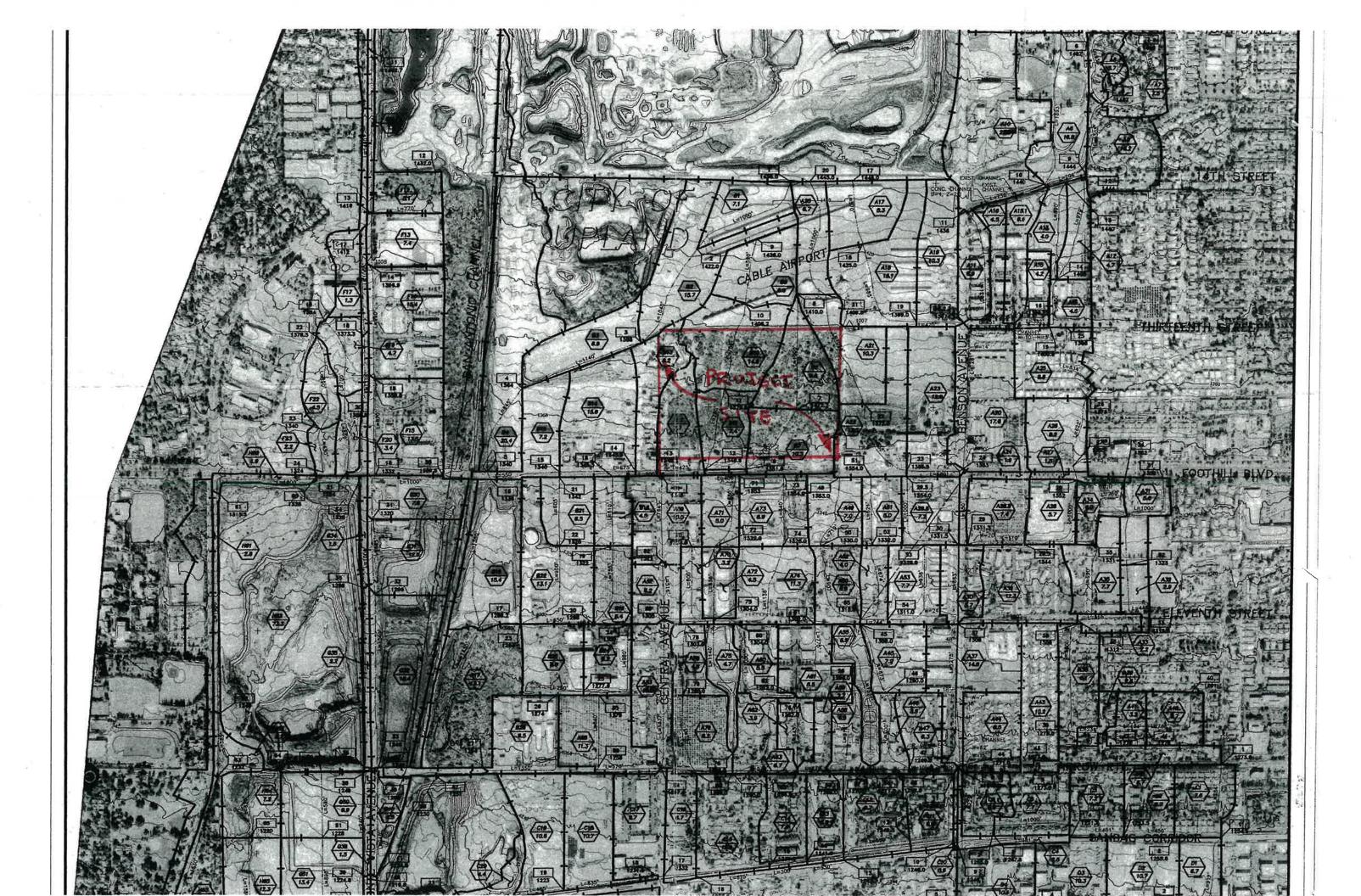
APPENDIX A

REFERENCE MATERIALS









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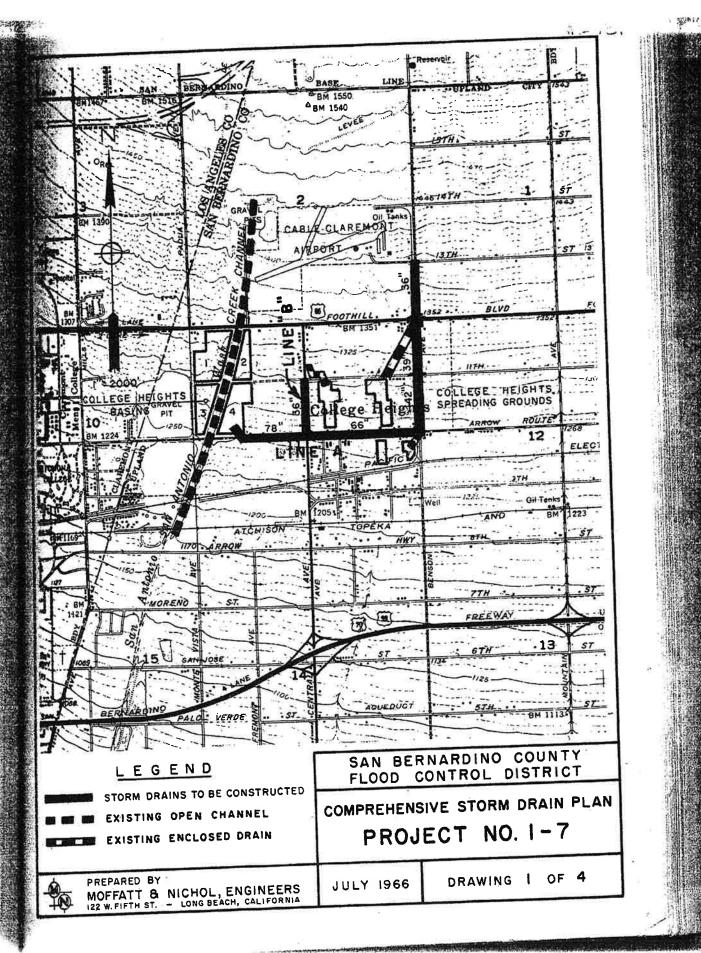
CITY OF MONTCUAIN

DIRECTOR OF PURICE VORES WEST SAN SERNARDING COUNTY COMPREHENSIVE STORM DRAIN PLAN PROJECT 1 MOFFATT & NICHOL ENGINEERS EXISTING & PROPOSED STORM DRAIN SYSTEMS MOFFATT & NICHOL ENGINEERS
PORTLAND, ORE
PARTIES OF MOCABE

DISCRIPTION OF TRANSPORT

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x2731



CITY OF UPLAND

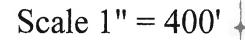
ENVIRONMENTAL DIVISION

#2A #1 SD-01-07 FOOTHILL BLVD.



#11A





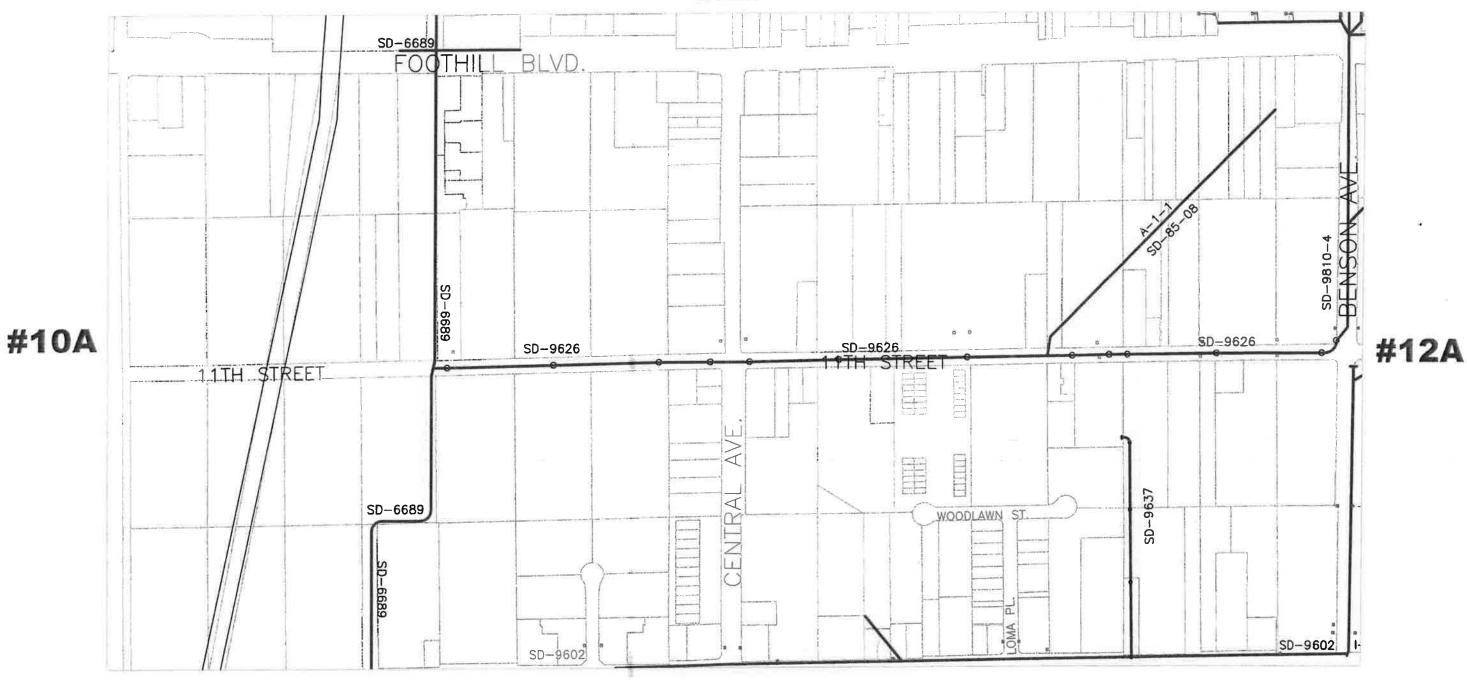
SEPTEMBER 2011



CITY OF UPLAND

ENVIRONMENTAL DIVISION





#11B



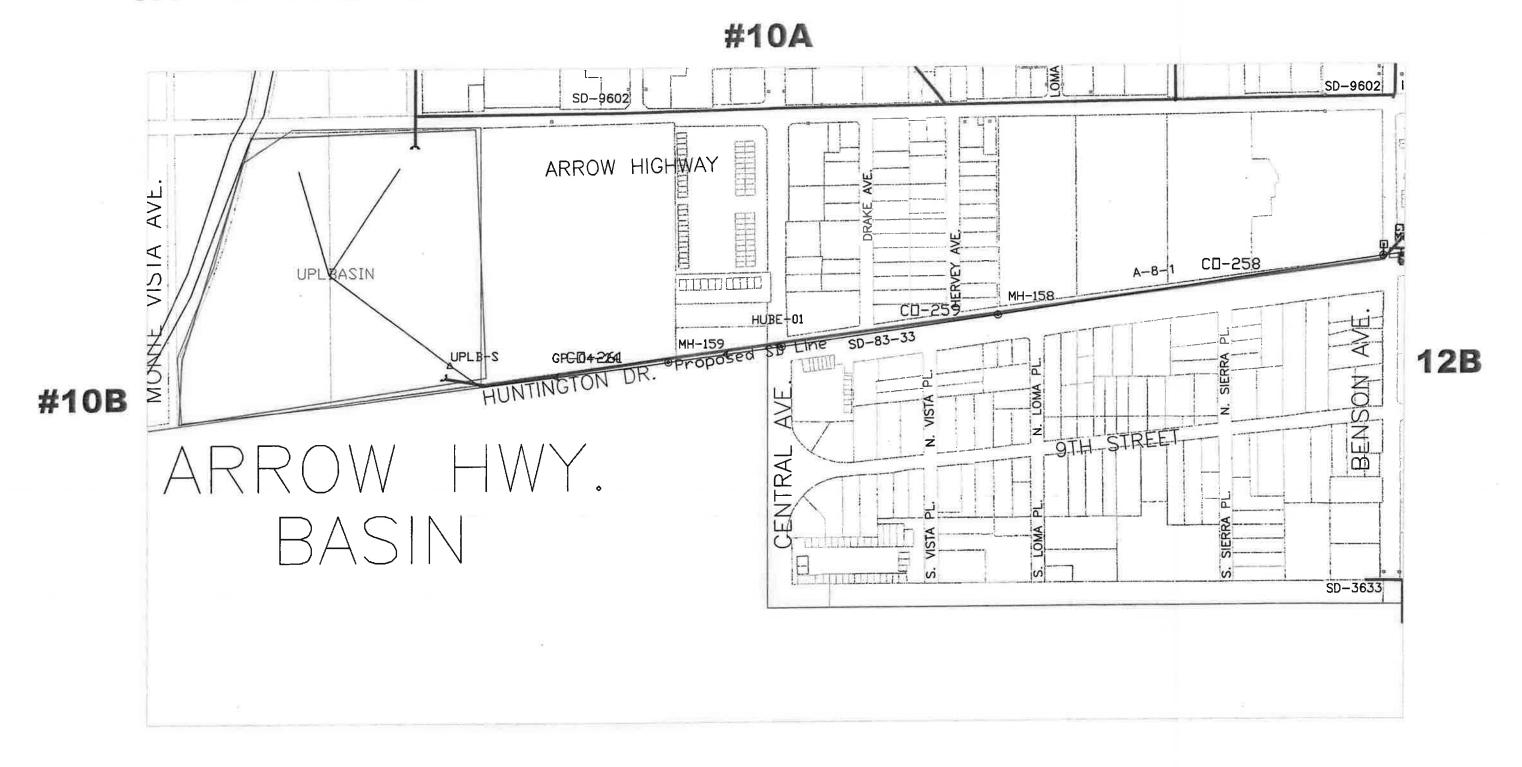
STORMDRAIN INDEX MAP - #11A

Scale 1" = 400'

SEPTEMBER 2011

CITY OF UPLAND

ENVIRONMENTAL DIVISION

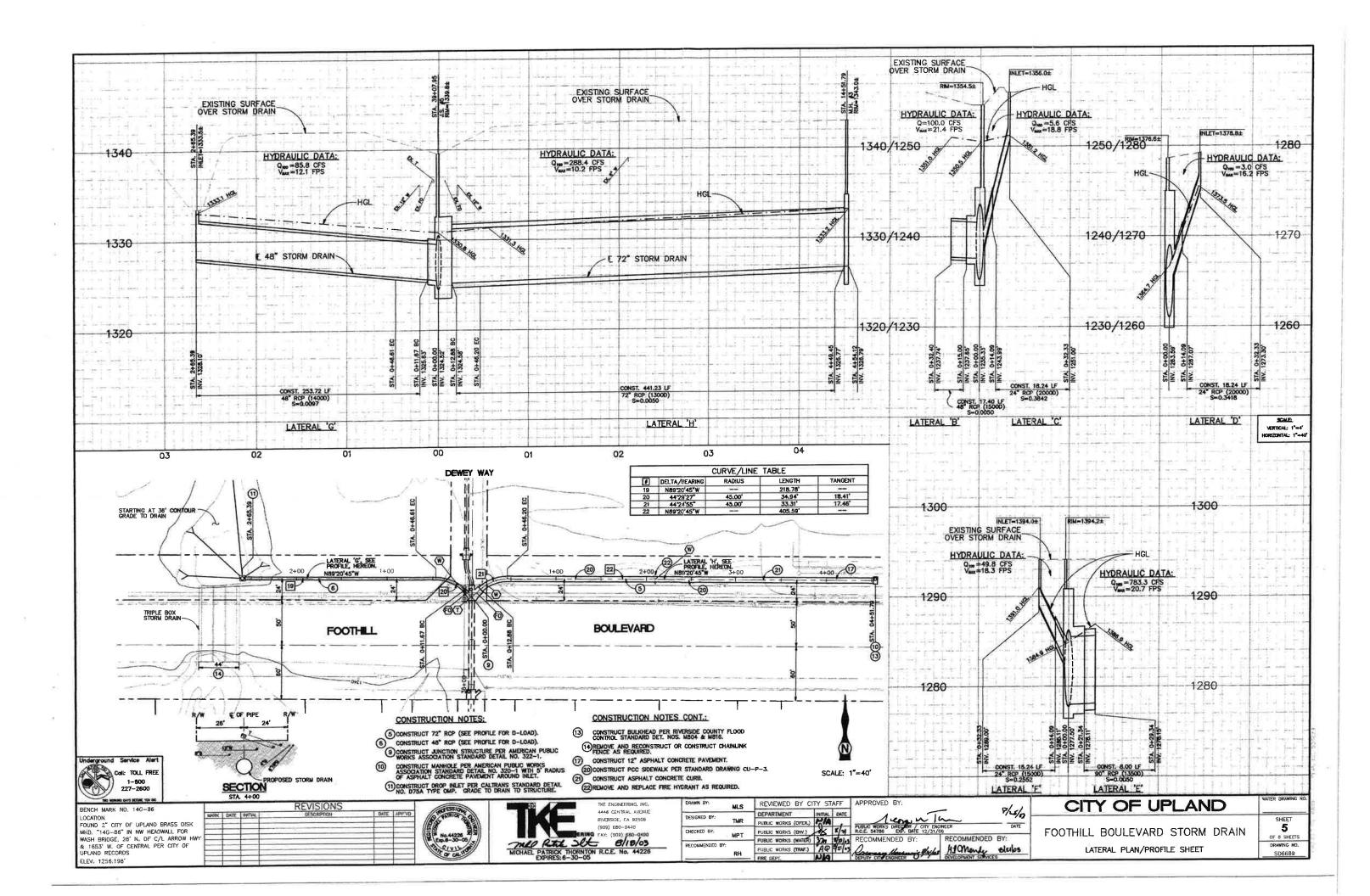


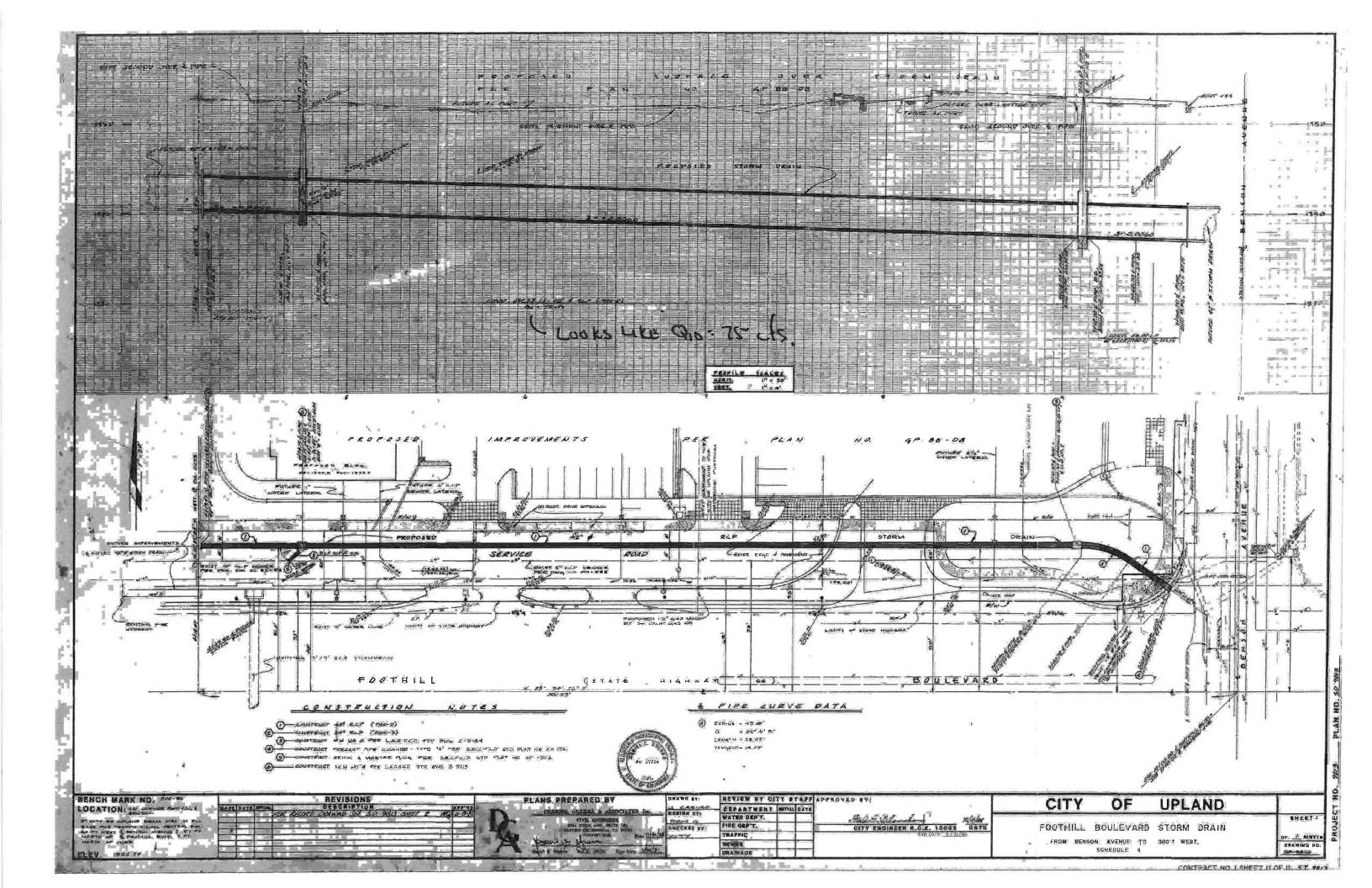


STORMDRAIN INDEX MAP - #11B

Scale 1'' = 400'

SEPTEMBER 2011





THE CONTRACTOR, BEFORE UNDERTAKING ANY GRADING OR CONSTRUCTION WORK OF ANY TYPE WITHIN THE PUBLIC RIGHT OF WAY, MUST FIRST OBTAIN A CONSTRUCTION PERMIT FROM THE PUBLIC WORKS DEPARTMENT.

A TEMPORARY STREET CLOSURE PERMIT IS REQUIRED IN ALL CASES WHERE WORK WILL IN ANY WAY INTERFERE WITH MEMOULAR OR PEDESTRIAN TRAFFIC. THE CONTRACTOR IS ADVISED THAT CITY COUNCIL RESOLUTION NO. 1656, DEALING WITH PROMPT RESTORATION OF CITY STREETS TORN UP DURING CONSTRUCTION, WILL BE ENFORCED IN ALL CASES WHERE THE PROVISIONS THEREOF ARE APPLICABLE.

INSPECTION BY THE CITY OF THE WORK CALLED FOR ON THE PLANS SHALL NOT, IN ANY WAY, RELIEVE THE CONTRACTOR AND/OR DEVELOPER OF THEIR OBLIGATION TO PERFORM WORK IN COMPLIANCE WITH THE PLANS

ANY ALTERATIONS OR VARIANCES FROM THE PLANS, EXCEPT MINOR ADJUSTMENTS IN THE FIELD TO MEET EXISTING CONDITIONS, SHALL BE REQUESTED IN WRITING AND MAY NOT BE INSTITUTED UNTIL APPROVED BY THE PUBLIC WORKS DIRECTOR OR HIS REPRESENTANTES ACTING SECRETICALLY UPON HIS INSTRUCTIONS.

ALL ELEVATIONS SHOWN ON THE PLANS ARE ESTABLISHED FROM CITY OF UPLANO DATUM PLANE.

CONCRETE ITEMS WHICH WILL BE SUBJECT TO VEHICULAR TRAFFIC SHALL BE BARRICAGED, AND NO VEHICULAR TRAFFIC SOOMER THAN SEVEN DAYS AFTER PLACING, OR WHEN THE CONTRACTOR FOR CONVENIENCE OF OPERATION SO DESIRES, CONCRETE CONTRINING EIGHT SACKS OF CEMENT PER CUBIC YARO MAY, AND SHALL IF SO DIRECTED BY THE ENGINEER, BE USED, AND TRAFFIC WILL BE PERMITTED THEREON SEVENTY—TWO HOURS AFTER PLACING OF SAID BIGHT SACK CONCRETE.

THE CONTRACTOR SHALL OPERATE IN A MANNER COMPLIANT WITH ALL APPLICABLE SECTIONS OF THE MUNICIPAL CODE AND COMPLIANT WITH ALL APPLICABLE CITY COUNCIL RESOLUTIONS.

ALL STATIONING REFERS TO CENTERLINE OF CONSTRUCTION UNLESS OTHERWISE NOTED. CATCH BASIN STATIONING IS BASED ON STREET CENTERLINE STATIONING.

STATIONING FOR LATERALS AND CONNECTOR PIPES REFERS TO THE CENTERLINE CENTERLINE INTERSECTION AND IS BASED ON STORM DRAIN STATIONING, STREET GENTERLINE STATIONING AND STORM ORAIN STATIONING ARE SEPARATE AND DIFFERENT FROM EACH OTHER.

PROTECT ALL UTILITIES, POLES, SIGNS, AND EXISTING IMPROVEMENTS IN PLACE UNLESS OTHERWISE DIRECTED BY THE ENGINEER OR NOTED ON THE PLANS, WHERE RELOCATION OF THESE UTILITIES ARE REQUIRED, I HE CONTRACTOR SHALL CORROBINATE CONSTRUCTION AS NECESSARY AND AS APPROVED BY THE ENGINEER.

"V" IS THE DEPTH OF INLET OF CATCH BASINS MEASURED FROM THE TOP OF CURB TO INVERT OF THE OUTLET

CATCH BASINS SHALL BE LOCATED SO THAT THE LOCAL DEPRESSION SHALL BEGIN AT CURB RETURN JOINTS, UNLESS OTHERWISE NOTED ON PLANS.

THE LOCATION OF UNDERGROUND UTILITY OR IRRIGATION LINES AS SHOWN ON THE PLANS, IS APPROXIMATE, AND SINCE THE ACTUAL, LOCATION MAY BE SOMEWHAT DIFFERENT FROM THAT SHOWN, THE CONTRACTOR IS REQUIRED TO CONTACT HE INTERESTED UTILITY OR WATER COMPANY BEFORE EXCAVATING IN THE WICHITY

THE FOLLOWING CITY OF UPLAND STD. OWGS. APPLY TO THIS PROJECT AND SHALL BE CONSIDERED AS PART OF THESE PLANS; CU-0-1, CU-0-2, CU-P-3, CU-P-4, CU-P-8, CU-R-2, CU-R-3, CU-S-1, CU-S-8

INSTALL PLYWOOD FALSE BOTTOMS IN ALL SEWER MANHOLES WITHIN THE CONSTRUCTION AREA. CHECK CALLY BY INSPECTOR

THE DEVELOPER SHALL BE RESPONSIBLE FOR SUBMITTING TO THE CITY, PROOF THAT A NOTICE OF INTENT (NOT) FOR THE GENERAL PERMIT FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY HAS BEEN FILED WITH AND APPROVAD BY THE STATE WATER RESOURCES CONTROL BOARD, CONSTRUCTION SHALL NOT COMMENCE WITHOUT THIS APPROVAL. THE DEVELOPER SHALL BE RESPONSIBLE TO COMPLY WITH THE GENERAL CORNER OF WITHOUT THE PROMIT OF WITH BUILDING THERE STORM WATER POLLUTION PREVENTION HAD FOR THE DURATION OF THE PROJECT.

22. ALL CATCH BASINS AND STORM ORAIN INLET FACILITIES SHALL BE STENCILEO WITH THE APPROPRIATE
"NO DUMPING" MESSAGE AS SUPPLIED BY THE PUBLIC WORKS DEPARTMENT, ENVIRONMENTAL DIVISION.

SURVEY MONUMENT NOTE:

SURVEY MONUMENTS THAT EXIST AS SHOWN ON RECORDED MAPS, HIGHWAY MAPS OR POINTS THAT PROVIDE SURVEY CONTROL WITHIN THE CONSTRUCTION AREA, SHALL BE LOCATED AND REFERENCED OUT BY A LICENSED LAND SURVEYOR OR REGISTERED CIVIL ENGINEER (AUTHORIZED TO PRACTICE LAND SURVEYNING), AND CORNER RECORDS SHALL BE FILED WITH THE COUNTY SURVEYOR PRIOR TO THE START OF CONSTRUCTION. THESE CORNER RECORDS SHALL DESCRIBE THE MONUMENTS FOUND WITH THE DISTANCES TO REFERENCE POINTS FOR RESETTING OF THE SURVEY MONUMENT. WHEN CONSTRUCTION IS COMPLETED, MONUMENTS SHALL BE SET AND CORNER RECORDS SHALL BE FILED WITH THE COUNTY SURVEYOR SHOWING THE NEW MONUMENTS.

ENGINEERS NOTICE TO CONTRACTOR

THE EXISTENCE AND APPROXIMATE LOCATION OF ANY UNDERGROUND UTILITIES PIPES OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE, THERE ARE NO EMSTRING UTILITIES OR STRUCTURES EXCEPT AS SHOWN ON THESE PLANS. THE ENGINEER ASSUMES NO LUBBLILITY AS TO THE EXACT LOCATION NEITHER OF SAID UNES NOR FOR UTILITIES OR IRRIGATION LINES WHOSE LOCATIONS ARE NOT SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING ALL UTILITY AND IRRIGATION COMPANIES PRIOR TO WORK ON EXCAVATION TO DETERMINE EXACT LOCATION OF ALL LINE AFFECTING THIS WORK, WHETHER OR NOT SHOWN HEREON, AND FOR ANY DAMAGE OR PROTECTION OF THESE LINES.

THE CONTRACTOR SHALL CALL IN A LOCATION REQUEST TO UNDERGROUND SERVICE ALERT (U.S.A.) PHONE 1-800-227-2600 TWO WORKING DAYS PRIOR TO DIGGING NO CONSTRUCTION PERMIT ISSUED BY PUBLIC WORKS OEPARTMENT SHALL BE VALID INVOLVING UNDERGROUND FACILITIES UNLESS THE APPLICANT HAS AN INQUIRY IDENTIFICATION NUMBER ISSUED BY U.S.A.

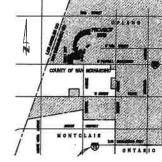


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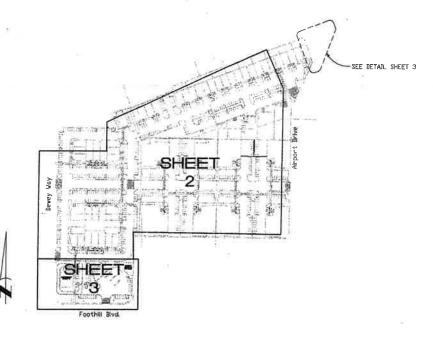


SITE IMPROVEMENT PLANS FOR

CABLE BUSINESS PARK



LOCATION MAP



INDEX MAP

OWNER / DEVELOPER SOILS ENGINEER

CABLE DEVELOPMENT, L.L.C. 428 EAST 25TH STREET UPLAND, CA 91784-1106

FAX (909) 982-4410

CONTACT: MR. GEORGE O VOIGT

10851 EDISON CT. RANCHO CUCAMONGA, CA 91730

PH: (909) 989-1751 FAX (909) 989-4287

CONTACT: MR. EO LYON

CONTRACTOR'S RESPONSIBILITY FOR SAFETY

IN SUBMITTING A BIO FOR THIS WORK THE CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER, THE ENGINEER AND THE CITY OF UPLAND HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER, THE ENGINEER, OR THE CITY OF UPLAND.

ALL CONTRACTORS AND SUBCONTRACTORS PERFORMING WORK SHOWN ON OR RELATED TO THESE PLANS SHALL CONDUCT THEIR OPERATIONS SO THAT EMPLOYEES ARE PROVIDED A SAFE PLACE TO WORK AND THE PUBLIC IS PROTECTED, ALL CONTRACTORS AND SUBCONTRACTORS SHALL COMPLY WITH THE "OCCUPATIONAL SAFETY AND HEALTH REGULATIONS" OF THE U.S. OEPARTMENT OF LABOR AND WITH "CONSTRUCTION SAFETY ORDERS". THE CIVIL ENGINEER SHALL NOT BE RESPONSIBLE IN ANY WAY FOR THE CONTRACTOR OR SUBCONTRACTORS COMPLIANCE WITH SAID REGULATIONS AND ORDERS.

ABBREVIATIONS

APWA	AMERICAN PUBLIC WORKS ASSOCIATION
8F	BOTTOM OF FOOTING
BOP	BOTTOM OF PIPE
FL	FLOW LINE
HOPE	HIGH DENSITY POLYETHYLENE PIPE
INV	INVERT
RCP	REINFORCED CONCRETE PIPE
SD	STORM ORAIN
TC	TDP OF CURB
TG	TOP OF GRATE
TOP	TOP OF PIPE
uer	INDECEDING SERVICE ALERT

AGENCY/UTILITY CONTACT LIST

SOUTHERN CALIFORNIA EDISON 216 NORTH EUCLIO AVENUE ONTARIO, CALIFORNIA 91761 (800) 684-8123

SAN ANTONIO WATER CO. 139 NORTH EUCLID AVENUE UPLANO, CALIFORNIA 91786 (909) 982-4107

CITY OF UPLANO WATER DIVISION 1370 NORTH BENSON AVENUE UPLAND, CALIFORNIA 91786 (909) 931-4230

P.O. BOX 3003 REOLANDS, CALIFORNIA 92373 (800) 427-2200

(9D9) 469-6336

140D EAST PHILLIPS BOULEVARD

POMONA, CALIFORNIA 91766-5432

CITY OF UPLANO DEVELOPMENT SERVICES 460 NORTH EUCLID AVENUE UPLANDS, CALIFORNIA 91786 (909) 931-4133 OR (909) 931-4145

CONSTRUCTION NOTES

45		
3)-	-NOT USED	
3-	-INSTALL 3D" INLINE E (H-20 RATEO), N-12 ond 12" N-12 FABRI PER ADVANCED DRAI	RAIN WITH CAST IRDN GRATE 3 EA DOWN DRAIN (Part No. 2730AG12) CATED 90' BEND (Part No. 1299-AN) NAGE SYSTEMS, Inc.
4)-	CONSTRUCT 30"# N- ORAIN PIPE BY ADVA	12 PROLINK ULTRA HDPE NCED DRAINAGE SYSTEMS, Inc. 388 LF
		12 PROLINK ULTRA HDPE NCED DRAINAGE SYSTEMS, Inc. 352 LF
6)-	CONSTRUCT 18" N-	12 PROLINK ULTRA HDPE NCED DRAINAGE SYSTEMS, Inc
7		12 PROLINK ULTRA HDPE NCED DRAINAGE SYSTEMS, Inc
-(B)	CONSTRUCT 12"Ø N- DRAIN PIPE BY ADVA	2 PROLINK ULTRA HDPE NCED DRAINAGE SYSTEMS, Inc. 273 LF
® –		2 FABRICATED TEE PER ADVANCEO nc Part No. 2467-AN 2 EA
		2 FABRICATED REDUCING WYE PER ADVANCEO nc Part No. 2484-AN
M -	NOT USED	
@-	INSTALL 30" INLINE DE (H-20 RATED), N-12 PER ADVANCED DRAIN	rain with cast iron grate Down Drain (Port No. 2730ag24) IAGE SYSTEMS, Inc
		FABRICATED REDUCER PER SYSTEMS, Inc PART No. 2476-ANB5 2 EA
(14)-	CONSTRUCT CURB IN	ET TYPE 8-1 PER CITY OF UPLAND STD.
(13)-	CONSTRUCT TRANSVER	ISE CATCH BASIN PER APWA STD. PLAN No
	NOT USED	
10)-	CDNSTRUCT GRATING O APWA STD. PLAN No.	CATCH BASIN, LONGITUOINAL, 3 GRATES, PER 3D4—2 1 EA
(18)—	CONSTRUCT 36" RCP	STORM DRAIN PIPE (D-2500) 180 LF
(6)	CONSTRUCT CURB INLE	T TYPE B-2 PER CITY, OF UPLAND STD.
@ —	INSTALL 15" INLINE OR N-12 DDWN DRAIN(PAR	AIN WITH LOCKING H-20 RATED GRATE, RT 2715AGN) PER ADVANCEO DRAINAGE
(2)-1	NSTALL 6" N-12 HDF	1 EA PE DRAIN PIPE BY ADVANCED DRAINAGE 145 LF
53	NETALL 15" INTINE OF	AIN WITH PEOESTRIAN GRATE DOWN DRAIN (PART No. 2715AGN) AGE SYSTEMS, Inc
(23)-1	NSTALL 6"#N-12 FABR	RICATED 90' BENO (PART NO. 0699AN)
@4- j	NSTALL 6"¢ N-12 FAB	RICATED TEE (PART No. OS61AN) SYSTEMS, Inc. 3 LF
(S)—(CONSTRUCT GRATING C	ATCH BASIN, LONGITUDINAL, 1 GRATE, No. 304-2 2 EA
26-p	CONSTRUCT GRATING C	ATCH BASIN, LDNGITUDINAL, 2 GRATES, No. 304-2 7 EA
67-C	CONSTRUCT INLET TYPE	"V" PER ORANGE COUNTY EMA
(28)— C	CONSTRUCT JUNCTION S	STRUCTURE PER APWA STD. PLAN No.
29 −ç		DRAIN PER APWA STD. PLAN No. 151-1,
@-	TEM NOT USED ON THE	

OCATION FOOTHILL BOULEVARD AND BENSON AVENUE

REVISIONS MARK DATE BY

Associated Engineers, Inc. 3311 E. SHELBY STREET - ONTARIO, CA 91764 TEL: (909) 980-1982 - FAX: (909) 941-0891

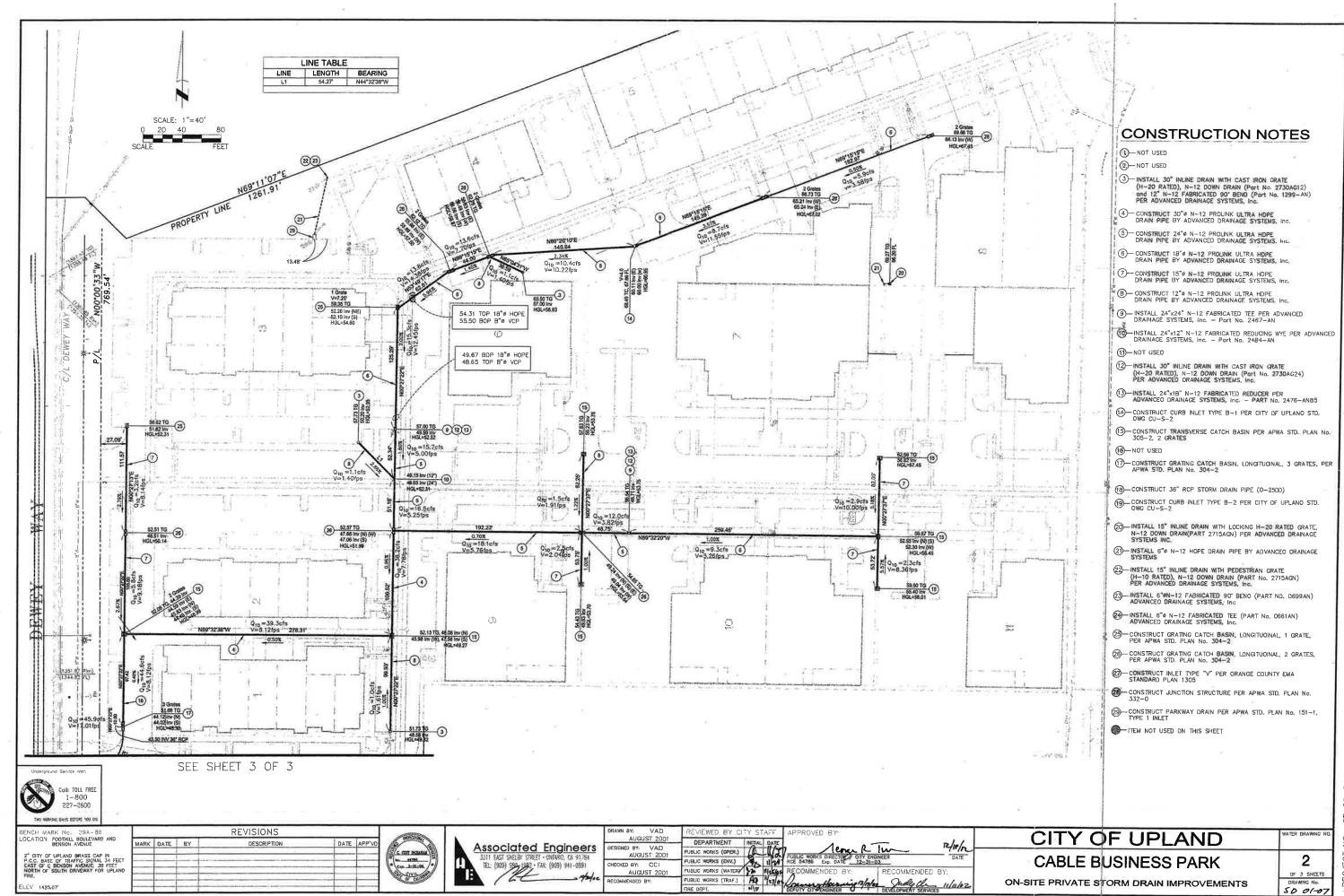
AWN BY: VAD REVIEWED BY CITY STAFF OEPARTMENT INSTIAL DATE AUGUST 2001 CHECKED BY: BWL AUGUST 2001 RECOMMENDED BY:

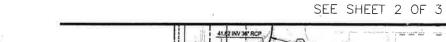


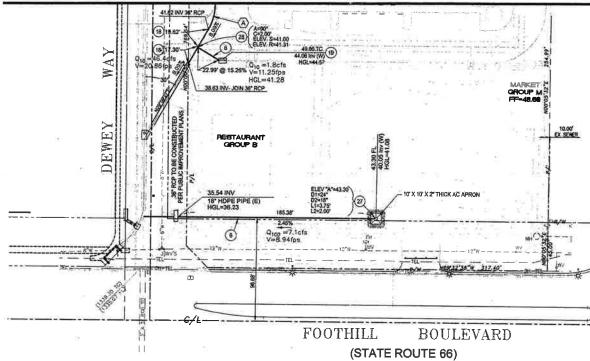
CITY OF UPLAND

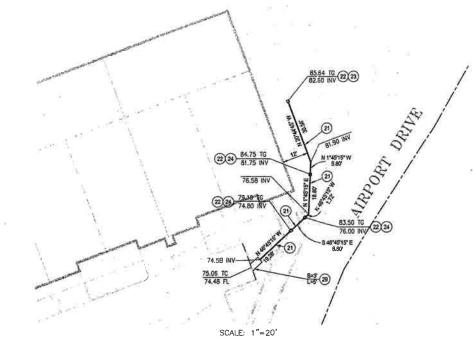
CABLE BUSINESS PARK ON-SITE PRIVATE STORM DRAIN IMPROVEMENTS

50 01-07









		CURVE TA	ABLE	
0	Δ	R	L	Τ.
(A)	33"58'48"	45.00	26.68'	13.73

CONSTRUCTION NOTES

- NDT USED
- NDT USED
- (H-20 RATED), N-12 DOWN DRAIN (Port No. 2730AG12)
 and 12" N-12 FABRICATED 9D' BEND (Port No. 1299-AN)
 PER ADVANCED DRAINAGE SYSTEMS, Inc.
- CONSTRUCT 3D" N-12 PROLINK ULTRA HDPE DRAIN PIPE BY ADVANCED DRAINAGE SYSTEMS, Inc.
- B CONSTRUCT 24" N-12 PROLINK UI TRA HDPE DRAIN PIPE BY ADVANCED DRAINAGE SYSTEMS, Inc.
- 6 CDNSTRUCT 18" N-12 PROLINK ULTRA HDPE DRAIN PIPE BY ADVANCED DRAINAGE SYSTEMS, Inc
- (8) CONSTRUCT 12"0 N-12 PROLINK ULTRA HOPE DRAIN PIPE BY ADVANCED DRAINAGE SYSTEMS, Inc.
- 9-INSTALL 24"x24" N-J2 FABRICATED TEE PER ADVANCED DRAINAGE SYSTEMS, Inc. Port No. 2467-AN
- (0-INSTALL 24"x12" N-12 FABRICATED REDUCING WYE PER ADVANCED DRAINAGE SYSTEMS, Inc. Port No. 2484-AN
- (H-2D RATED), N-12 DOWN DRAIM (Port No. 273DAG24)
 PER ADVANCED DRAIMAGE SYSTEMS Inc.
- (3)—INSTALL 24"x18" N-12 FABRICATED REDUCER PER ADVANCED DRAINAGE SYSTEMS, Inc. PART NO. 2476-ANBS
- CDNSTRUCT CURB INLET TYPE 8-1 PER CITY DF UPLAND STD. DWG CU-5-2
- (B)—CDNSTRUCT TRANSVERSE CATCH BASIN PER APWA STD. PLAN No. 3DS-2, 2 GRATES
- CONSTRUCT GRATING CATCH BASIN, LDNGITUDINAL, 3 GRATES, PER APWA STD. PLAN No. 304-2
- (B-CDNSTRUCT 36" RCP STDRM DRAIN PIPE (0-250D)
- 19-CONSTRUCT CURB INLET TYPE B-2 PER CITY DF UPLAND STD. DWG CU-S-2
- (0)—INSTALE 15" INLINE DRAIN WITH LOCKING H-2D RATED GRATE, N-12 DOWN DRAIN(PART 2715AGN) PER ADVANCED DRAINAGE SYSTEMS INC.
- (2)-INSTALL 6" N-12 HDPE DRAIN PIFE BY ADVANCED DRAINAGE SYSTEMS
- (2)—INSTALL 15" INLINE DRAIN WITH PEDESTRIAN GRATE (H-10 RATED), N-12 DOWN DRAIN (PART No. 2715AGN) PER ADVANCED DRAINAGE SYSTEMS, Inc.
- (3)—INSTALL 6"EN-12 FABRICATED 90" BEND (PART ND. D699AN)
 ADVANCED DRAINAGE SYSTEMS, Inc.
- 24-INSTALL 6" N-12 FABRICATED TEE (PART No. 0661AN)
 ADVANCED DRAINAGE SYSTEMS, Inc.
- CONSTRUCT GRATING CATCH BASIN, LDNGITUDINAL, 1 GRATE, PER APWA STD. PLAN No. 304-2
- CONSTRUCT GRATING CATCH BASIN, LDNGITUDINAL, 2 GRATES, PER APWA STD. PLAN No. 3D4-2
- O-CONSTRUCT INLET TYPE "V" PER ORANGE COUNTY EMA STANDARD PLAN 1305
- 28 CDNSTRUCT JUNCTION STRUCTURE PER APWA STD. PLAN No. 332-D
- 29-CDNSTRUCT PARKWAY DRAIN PER APWA STD. PLAN No. 151-1, TYPE 1 INLET

TIEM NOT USED DN THIS SHEET

Undergroun	d Senice Arm
(8)	Call: TOLL FREE 1-800 227-2600
TWO WORKERS	DIG LOS TROTTE PAGE O

SHT-3

2:1 Slope

BENCH MARK No. 29A-86 LOCATION FOOTHILL BOULEVARD AND BENSON AVENUE	~
2" CITY OF UPLAND BRASS CAP IN P.C.C. BASE OF TRAFFIC SIGNAL 34 FEET EAST OF @ EENSON AVENUE; 38 FEET NORTH OF SOUTH DRIVEWAY FOR UPLAND	

DO MARK NO. 256-00	REVISIONS					
ATION FOOTHILL BOULEVARD AND BENSON AVENUE	MARK	DATE	BY	DESCRIPTION	DATE	APP'V
CITY OF UPLAND BRASS CAP IN C. BASE OF TRAFFIC SIGNAL 34 FEET TO F Q BENSON AVENUE, 38 FEET RITH OF SOUTH DRIVEWAY FOR UPLAND E.						
1425,07						

Profile

2:1 Slope

Plan View

Temporary Cage Inlet

N.T.S.

Install 30* Inline Drain and N-12 Down Drain (Part No 2730AG18)





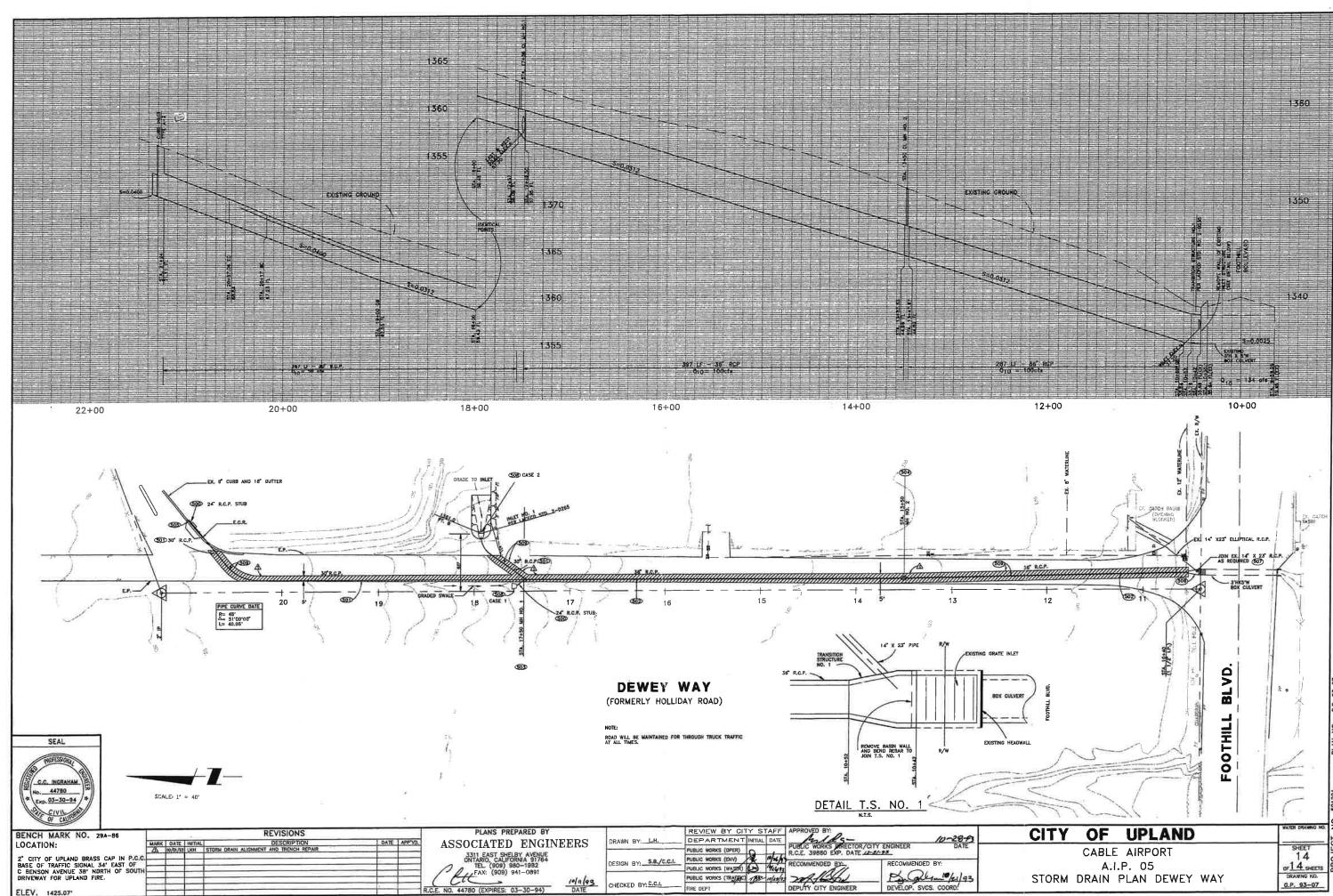
DRAWN BY: VAD		REVIEWED BY CITY STAFF			T
	AUGUST 2001	DEPARTMENT	INITIAL	DATE	
	DESIGNED BY: VAD AUGUST 2001	PUBLIC WORKS (OPER.)	1	iÚZ	
	CHECKED BY: CCI	PUBLIC WORKS (ENV.)	X	11/22	
	AUGUST 2001	PUBLIC WORKS (WATER)	YA	142400	Ī
ı	RECOMMENDED BY:	PUBLIC WORKS (TRAF.)	AG	1/27/01	į
ı	N Y	FIRE DEPT	all be		

F	APPROVED BY:	
ATE (2)	PUBLIC WORKS DIRECTOR OUTY RCE 54786 EKP. OATE 12-3	ENGINEER DATE
7/0	RECOMMENDED BY:	RECOMMENDED BY:

CI	TY	OF	UPL	LAND

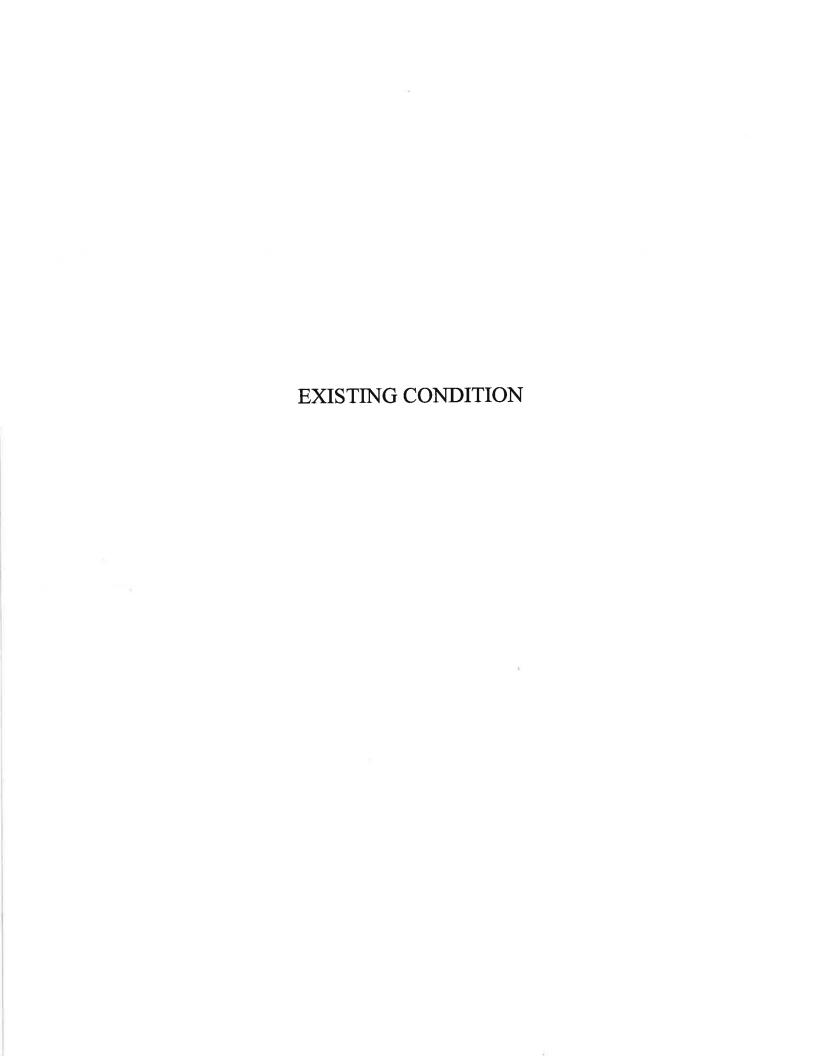
CABLE BUSINESS PARK ON-SITE PRIVATE STORM DRAIN IMPROVEMENTS

3 OF 3 SHEETS 5001-07



APPENDIX B

HYDROLOGY CALCULATIONS



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RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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```

Analysis prepared by:

```
* TEI 3651
  EXISTING CONDITION
  100-YEAR EVENT (NODES 100-102)
  FILE NAME: W:\3651\EX100.DAT
  TIME/DATE OF STUDY: 08:51 05/08/2018
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-----------------
                           --*TIME-OF-CONCENTRATION MODEL*--
  USER SPECIFIED STORM EVENT(YEAR) = 100.00

SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00

SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000 USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.5500
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
      HALF- CROWN TO STREET-CROSSFALL:
WIDTH CROSSFALL IN- / OUT-/PARK-
(FT) (FT) SIDE / SIDE/ WAY
                                                         CURB GUTTER-GEOMETRIES: MANNING
HEIGHT WIDTH LIP HIKE FACTOR
                                                                      (FT)
                                                                             (FT)
                                                                                     (FT)
                                                                                                 (n)
                                                           (FT)
NO -
                                                                      2.00 0.0313 0.167 0.0150
                               0.018/0.018/0.020
                                                          0.67
        30.0
                    20.0
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
   as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)

2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED
*****************
  FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 21
  >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<>>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
  INITIAL SUBAREA FLOW-LENGTH(FEET) = 563.00

INITIAL SUBAREA FLOW-LENGTH(FEET) = 1394.60 DOWNSTREAM(FEET) = 1376.30
  TC = K^*[(LENGTH^{**} 3.00)/(ELEVATION CHANGE)]^{**}0.20
  SUBAREA ANALYSIS USED MINIMUM TC(MIN.) =
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =
SUBAREA TC AND LOSS RATE DATA(AMC III):
                                                             13.121
                                                            3.859
                                  SCS SOIL AREA FP AP SCS
GROUP (ACRES) (INCH/HR) (DECIMAL) CN
    DEVELOPMENT TYPE/
                                                                                                (MIN.)
         LAND USE
  NATURAL POOR COVER "OPEN BRUSH"
  SUBAREA AVERAGE PERVIOUS LOSS RATE, FP(INCH/HR) = 0.35
SUBAREA AVERAGE PERVIOUS AREA FRACTION, AP = 1.000
SUBAREA RUNOFF(CFS) = 9.15
TOTAL AREA (APPE)
                                                                                          81
                                                                                                 13.12
                                     2.90 PEAK FLOW RATE(CFS) =
                                                                                    9.15
  TOTAL AREA(ACRES) =
*****************
                                   101.00 TO NODE 102.00 IS CODE = 52
  FLOW PROCESS FROM NODE
  >>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<
  >>>>TRAVELTIME THRU SUBAREA
  ELEVATION DATA: UPSTREAM(FEET) = 1376.30 DOWNSTREAM(FEET) = 1358.00
  CHANNEL LENGTH THRU SUBAREA(FEET) = 560.00
CHANNEL FLOW THRU SUBAREA(CFS) = 9.15
                                                                  CHANNEL SLOPE = 0.0327
  CHANNEL FLOW THRU SUBAREA(CFS) = 9.15

FLOW VELOCITY(FEET/SEC) = 4.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)

TRAVEL TIME(MIN.) = 2.11 TC(MIN.) = 15.23

100.00 TO NODE 102.00 = 1123.00 FEE
                                                                    102.00 =
                                           100.00 TO NODE
                                                                                     1123.00 FEET.
   LONGEST FLOWPATH FROM NODE
```

_

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```

Analysis prepared by:

THIENES ENGINEERING, INC. 14349 FIRESTONE BLVD LA MIRADA, CA 90638 714-521-4811

```
* FXTSTING CONDITION
* 100-YEAR EVENT (NODES 200-202)
 FILE NAME: W:\36S1\EX200.DAT
 TIME/DATE OF STUDY: 09:10 01/24/2020
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--*TIME-OF-CONCENTRATION MODEL*--
 USER SPECIFIED STORM EVENT(YEAR) = 100.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
 *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
 SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) \ vs. \ LOG(Tc;MIN)) = 0.6000
 USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.5500
 *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*
 *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
   HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
   WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
                                      (FT) (FT) (FT) (n)
                 SIDE / SIDE/ WAY
                                (FT)
         (FT)
NO.
   (FT)
         ----
                 0.018/0.018/0.020 0.67 2.00 0.0312 0.167 0.0150
          20.0
   30.0
 GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
   1. Relative Flow-Depth = 0.00 FEET
     as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
   2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
 *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
  OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
 *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED
*************************
 FLOW PROCESS FROM NODE 200.00 TO NODE
                                   201.00 IS CODE = 21
 -----
 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
INITIAL SUBAREA FLOW-LENGTH(FEET) = 803.00
 ELEVATION DATA: UPSTREAM(FEET) = 1403.00 DOWNSTREAM(FEET) = 1369.50
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.387
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.6S1
 SUBAREA TC AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/
                    SCS SOIL AREA
                                    Fp
                                             Αp
                     GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
     LAND USE
                                         Page 1
```

EX200.RES

```
NATURAL POOR COVER
                                                81 14.39
                                           1.000
                            S.70
                                   0.35
 "OPEN BRUSH"
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.3S
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
                  16.92
 SUBAREA RUNOFF(CFS) =
                         PEAK FLOW RATE(CFS) =
                    S.70
 TOTAL AREA(ACRES) =
************************
                                 202.00 IS CODE ≈ S2
 FLOW PROCESS FROM NODE 201.00 TO NODE
_____
 >>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<
 >>>>TRAVELTIME THRU SUBAREA<
ELEVATION DATA: UPSTREAM(FEET) = 1369.S0 DOWNSTREAM(FEET) = 13S1.90
 CHANNEL LENGTH THRU SUBAREA(FEET) = 691.00 CHANNEL SLOPE = 0.02SS
CHANNEL FLOW THRU SUBAREA(CFS) = 16.92
 FLOW VELOCITY(FEET/SEC) = 4.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 2.52 Tc(MIN.) = 16.91
 LONGEST FLOWPATH FROM NODE
                      200.00 TO NODE
                                     202.00 =
                                              1494.00 FEET.
**********************
 FLOW PROCESS FROM NODE 202.00 TO NODE 202.00 IS CODE = 81
------
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<
MAINLINE Tc(MIN.) = 16.91
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.314
 SUBAREA LOSS RATE DATA(AMC III):
                   SCS SOIL AREA
                                   Fp
  DEVELOPMENT TYPE/
     LAND USE
                    GROUP (ACRES) (INCH/HR) (DECIMAL) CN
 NATURAL POOR COVER
                            3.15
                                    0.35
 "OPEN BRUSH"
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.35
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 3.1S SUBAREA RUNOFF(CFS) = 8.40

EFFECTIVE AREA(ACRES) = 8.8S AREA-AVERAGED Fm(INCH/HR) = 0.3S

AREA-AVERAGED Fp(INCH/HR) = 0.3S AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 8.9
                            PEAK FLOW RATE(CFS) =
END OF STUDY SUMMARY:
                        8.9 TC(MIN.) =
 TOTAL AREA(ACRES)
                    8.8S AREA-AVERAGED Fm(INCH/HR)= 0.3S
 EFFECTIVE AREA(ACRES) =
 AREA-AVERAGED Fp(INCH/HR) = 0.3S AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS) = 23.59
______
END OF RATIONAL METHOD ANALYSIS
```

Page 2

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```

Analysis prepared by:

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*******************
* TEI 3651
  EXISTING CONDITION

100-YEAR EVENT (NODES 300-303)
  FILE NAME: W:\3651\EX300.DAT
TIME/DATE OF STUDY: 08:51 05/07/2018
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
         ______
                          --*TIME-OF-CONCENTRATION MODEL*--
  USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000 user specified 1-hour intensity(Inch/Hour) = 1.5500
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
      HALF- CROWN TO
WIDTH CROSSFALL
                             STREET-CROSSFALL: CURB GUTTER-GEOMETRIES:
IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE
SIDE / SIDE/ WAY (FT) (FT) (FT)
                                                                                           MANNING
                                                                                            FACTOR
                                                                                               (n)
                  (FT)
                                                         0.67
                                                                    2.00 0.0312 0.167 0.0150
                              0.018/0.018/0.020
        30.0
                   20.0
  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

    Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)

  2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
  OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED
*****************
  FLOW PROCESS FROM NODE 300.00 TO NODE
                                                          301.00 \text{ IS CODE} = 21
  >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
                                        FEET) = 585.00
  INITIAL SUBAREA FLOW-LENGTH(FEET) = 585.00

1399.00 DOWNSTREAM(FEET) = 1383.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  * 100 YEAR ANALYSIS USED MINIMUM TC(MIN.) = 13.792

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.745

SUBAREA TC AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ SCS SOIL AREA FP AP

LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL)
                                                                                              (MIN.)
                                                                                       CN
  NATURAL POOR COVER "BARREN"
  "BARREN" A 5.85 0.18
SUBAREA AVERAGE PERVIOUS LOSS RATE, FP(INCH/HR) =
SUBAREA AVERAGE PERVIOUS AREA FRACTION, AP = 1.00
                                                                                        93
                                                                                              13.79
                                                                            1.000
                                                                     0.18
  SUBAREA RUNOFF(CFS) =
                                     18.77
                                    5.85 PEAK FLOW RATE(CFS) =
  TOTAL AREA(ACRES) =
*************
                                     301.00 TO NODE
                                                          302.00 \text{ IS CODE} = 52
  FLOW PROCESS FROM NODE
  >>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<>>>>>TRAVELTIME THRU SUBAREA<
  ELEVATION DATA: UPSTREAM(FEET) = 1383.00 DOWNSTREAM(FEET) = 1367.90 CHANNEL LENGTH THRU SUBAREA(FEET) = 341.00 CHANNEL SLOPE = 0.0443 CHANNEL FLOW THRU SUBAREA(CFS) = 18.77 FLOW VELOCITY(FEET/SEC) = 6.20 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL) TRAVEL TIME(MIN.) = 0.92 TC(MIN.) = 14.71 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 302.00 = 926.00 FEET
                                                                                         1367.90
                                                                                    926.00 FEET.
```

```
*********************
  FLOW PROCESS FROM NODE 302.00 TO NODE 302.00 IS CODE = 81
  >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<
                                    14.71
   MAINLINE TC(MIN.) =
     100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.603
   SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL
                                                        ARÉA
                                                    (ACRES) (INCH/HR) (DECIMAL) CN
          LAND USE
                                         GROUP
   NATURAL POOR COVER
"BARREN"
                                                                         0.18
                                                         5.35
  SUBAREA AVERAGE PERVIOUS LOSS RATE, FP(INCH/HR) = 0.18
SUBAREA AVERAGE PERVIOUS AREA FRACTION, AP = 1.000
SUBAREA AREA(ACRES) = 5.35
SUBAREA RUNOFF(CFS) = 16.48
EFFECTIVE AREA(ACRES) = 11.20
AREA-AVERAGED FM(INCH/HR) = 0.18
AREA-AVERAGED FP(INCH/HR) = 0.18
TOTAL AREA(ACRES) = 11.2
PEAK FLOW RATE(CFS) = 34.50
****************
   FLOW PROCESS FROM NODE 302.00 TO NODE 303.00 IS CODE = 52
   >>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<
  >>>>TRAVELTIME THRU SUBAREA<
  ELEVATION DATA: UPSTREAM(FEET) = 1367.90 DOWNSTREAM(FEET) = 1351.00 CHANNEL LENGTH THRU SUBAREA(FEET) = 449.00 CHANNEL SLOPE = 0.0376 CHANNEL FLOW THRU SUBAREA(CFS) = 34.50 FLOW VELOCITY(FEET/SEC) = 6.76 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL) TRAVEL TIME(MIN.) = 1.11 TC(MIN.) = 15.82 LONGEST FLOWPATH FROM NODE 300.00 TO NODE 303.00 = 1375.00 FEET
                                                                                                      1351.00
                                                                                            1375.00 FEET.
*******************
   FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 81
  >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<
  MAINLINE TC(MIN.) = 15.82 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.449
   SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL
                                                   L AREA FP AP SCS (ACRES) (INCH/HR) (DECIMAL) CN
         LAND USE
                                       GROUP
  "BARREN" A 7.00 0.18 1.000 93

SUBAREA AVERAGE PERVIOUS LOSS RATE, FP(INCH/HR) = 0.18

SUBAREA AVERAGE PERVIOUS AREA FRACTION, AP = 1.000

SUBAREA AREA(ACRES) = 7.00 SUBAREA RUNOFF(CFS) = 20.60

EFFECTIVE AREA(ACRES) = 18.20 AREA-AVERAGED FM(INCH/HR) = 0.18

AREA-AVERAGED FP(INCH/HR) = 0.18 AREA-AVERAGED AP = 1.00

TOTAL AREA(ACRES) = 18.2 PEAK FLOW RATE(CFS) = 53.55
   NATURAL POOR COVER
"BARREN"
   END OF STUDY SUMMARY:
  TOTAL AREA(ACRES) = 18.2 TC(MIN.) = 15.82

EFFECTIVE AREA(ACRES) = 18.20 AREA-AVERAGED FM(INCH/HR) = 0.18

AREA-AVERAGED FP(INCH/HR) = 0.18 AREA-AVERAGED AP = 1.000

PEAK FLOW RATE(CFS) = 53.55
______
    ______
```

END OF RATIONAL METHOD ANALYSIS

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          Ver. 23.0 Release Date: 07/01/2016 License ID 143S
                     Analysis prepared by:
                    THIENES ENGINEERING, INC.
                      14349 FIRESTONE BLVD
                      LA MIRADA, CA 90638
                         714-S21-4B11
* TEI 36S1
* EXISTING CONDITION
* 100-YEAR EVENT (NODES 400-402)
 FILE NAME: W:\36S1\EX400.DAT
 TIME/DATE OF STUDY: 09:11 01/24/2020
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--*TIME-OF-CONCENTRATION MODEL*--
 USER SPECIFIED STORM EVENT(YEAR) = 100.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.9S
 *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
 SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
 USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.SS00
 *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*
 *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
    HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
    WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
                                       (FT) (FT) (FT)
          (FT) SIDE / SIDE/ WAY
                                 (FT)
                                                       (n)
NO.
    (FT)
         ------ -----
--- ----
                  0.018/0.018/0.020 0.67 2.00 0.0312 0.167 0.0150
   30.0
           20.0
 GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
   1. Relative Flow-Depth = 0.00 FEET
     as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
   2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
  OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED
 *********************
  FLOW PROCESS FROM NODE 400.00 TO NODE 401.00 IS CODE = 21
 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
INITIAL SUBAREA FLOW-LENGTH(FEET) = S98.00
 ELEVATION DATA: UPSTREAM(FEET) = 1399.70 DOWNSTREAM(FEET) = 1377.50
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
```

SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.0B9 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.864 SUBAREA TC AND LOSS RATE DATA(AMC III):

SCS SOIL AREA

DEVELOPMENT TYPE/

LAND USE

Page 1

Ар

Fp

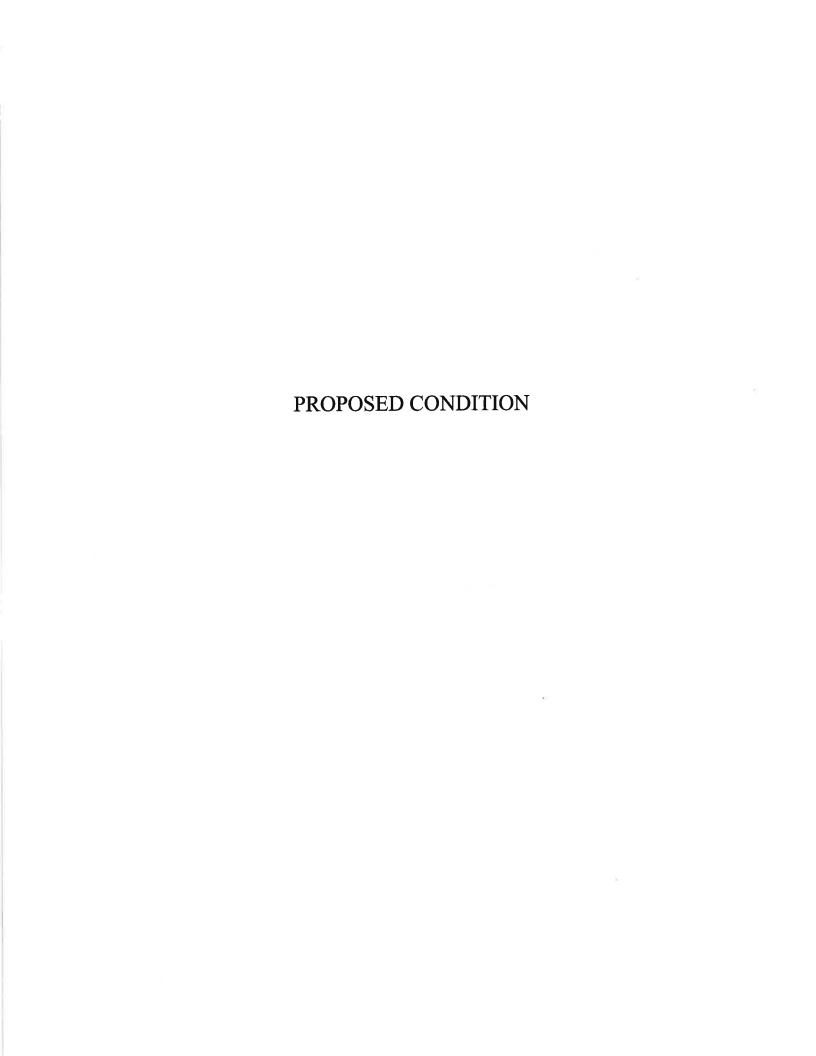
GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)

EX400.RES

```
NATURAL POOR COVER
                                                   93 13.09
                                     0.18
                                            1.000
                             8.60
 "BARREN"
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.18
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA RUNOFF(CFS) =
                     28.52
                          PEAK FLOW RATE(CFS) =
 TOTAL AREA(ACRES) =
                     8.60
*****************************
 FLOW PROCESS FROM NODE 401.00 TO NODE
                                  402.00 IS CODE = S2
______
 >>>>COMPUTE NATURAL VALLEY CHANNEL FLOW
 >>>>TRAVELTIME THRU SUBAREA
ELEVATION DATA: UPSTREAM(FEET) = 1377.S0 DOWNSTREAM(FEET) = 1348.40
 CHANNEL LENGTH THRU SUBAREA(FEET) = 804.00 CHANNEL SLOPE = 0.0362
CHANNEL FLOW THRU SUBAREA(CFS) = 28.52
 CHANNEL FLOW THRU SUBAREA(CFS) =
 FLOW VELOCITY(FEET/SEC) = 6.28 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) = 2.13 Tc(MIN.) = 15.22
 LONGEST FLOWPATH FROM NODE
                        400.00 TO NODE
                                       402.00 =
                                                1402.00 FEET.
************************
 FLOW PROCESS FROM NODE 402.00 TO NODE 402.00 IS CODE = 81
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<
_______
 MAINLINE Tc(MIN.) = 15.22
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.S30
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/
                    SCS SOIL
                            AREA
                                    Fρ
                          (ACRES) (INCH/HR) (DECIMAL) CN
     LAND USE
                     GROUP
 NATURAL POOR COVER
                             7.20
                                     0.18
 "BARREN"
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.18
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
 SUBAREA AREA(ACRES) = 7.20 SUBAREA RUNOFF(CFS) = 21.71

EFFECTIVE AREA(ACRES) = 15.80 AREA-AVERAGED Fm(INCH/HR) = 0.18

AREA-AVERAGED Fp(INCH/HR) = 0.18 AREA-AVERAGED Ap = 1.00
 TOTAL AREA(ACRES) = 15.8
                             PEAK FLOW RATE(CFS) =
                                                   47.63
______
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)
                        1S.8 TC(MIN.) =
                     1S.80 AREA-AVERAGED Fm(INCH/HR)= 0.18
 EFFECTIVE AREA(ACRES) =
 AREA-AVERAGED Fp(INCH/HR) = 0.18 AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS) = 47.63
______
 END OF RATIONAL METHOD ANALYSIS
```



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```
* TEI JOB NO 36S1
* 100-YEAR STORM EVENT
 PROPOSED CONDITION (NODES 100-304)
 FILE NAME: W:\36S1\PRELIM\100P.DAT
 TIME/DATE OF STUDY: 13:27 01/24/2020
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
______
               --*TIME-OF-CONCENTRATION MODEL*--
 USER SPECIFIED STORM EVENT(YEAR) = 100.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
 SPECIFIED PERCENT OF GRADIENTS (DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
 *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
 SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
 USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.SS00
 *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*
 *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
   HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
   WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
                 SIDE / SIDE/ WAY
                               (FT)
                                      (FT) (FT) (FT)
NO.
    (FT)
           (FT)
20.0 0.018/0.018/0.020 0.67
                                       2.00 0.0312 0.167 0.0150
 1 30.0
 GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
   1. Relative Flow-Depth = 0.00 FEET
     as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
   2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
 *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
  OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
 *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED
*************************
 FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 21
         ______
 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
INITIAL SUBAREA FLOW-LENGTH(FEET) = 381.00
 ELEVATION DATA: UPSTREAM(FEET) = 1397.20 DOWNSTREAM(FEET) = 1386.94
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = S.750
 SUBAREA TC AND LOSS RATE DATA(AMC III):
                                             Αp
  DEVELOPMENT TYPE/
                    SCS SOIL AREA
                                    Fр
                          (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
                     GROUP
     LAND USE
```

```
1.25
                                   0.74
                                                      6.75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 6.39
                   1.2S PEAK FLOW RATE(CFS) =
 TOTAL AREA(ACRES) =
*************************
 FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 31
......
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
ELEVATION DATA: UPSTREAM(FEET) = 1382.94 DOWNSTREAM(FEET) = 1376.94
 FLOW LENGTH(FEET) = 200.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 9.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.45
                                NUMBER OF PIPES = 1
 ESTIMATED PIPE DIAMETER(INCH) = 12.00
 PIPE-FLOW(CFS) =
               6.39
 PIPE TRAVEL TIME(MIN.) = 0.35 Tc(MIN.) =
                                     7.10
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE
                                     102.00 =
FLOW PROCESS FROM NODE 102.00 TO NODE 102.00 IS CODE = 81
......
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<
_______
 MAINLINE Tc(MIN.) =
                 7.10
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = S.S77
 SUBAREA LOSS RATE DATA(AMC III):
                                  Fp
  DEVELOPMENT TYPE/ SCS SOIL AREA
    LAND USE
                   GROUP (ACRES) (INCH/HR) (DECIMAL) CN
                     Α
                           1.40
                                  0.74
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 1.40 SUBAREA RUNOFF(CFS) = 6.93

EFFECTIVE AREA(ACRES) = 2.6S AREA-AVERAGED Fm(INCH/HR) = 0.07

AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) =
                     2.7
                            PEAK FLOW RATE(CFS) =
*********************
 FLOW PROCESS FROM NODE 102.00 TO NODE 103.00 IS CODE = 31
>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<
ELEVATION DATA: UPSTREAM(FEET) = 1376.94 DOWNSTREAM(FEET) = 1371.54
 FLOW LENGTH(FEET) = 180.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 10.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.71
                                NUMBER OF PIPES = 1
 ESTIMATED PIPE DIAMETER(INCH) = 18.00
 PIPE-FLOW(CFS) = 13.13
 PIPE TRAVEL TIME(MIN.) = 0.26 Tc(MIN.) = LONGEST FLOWPATH FROM NODE 100.00 TO NODE
                          Tc(MIN.) =
                                     7.36
                                     103.00 =
                                             761.00 FEET.
*********************
 FLOW PROCESS FROM NODE 103.00 TO NODE 103.00 IS CODE = 81
-----
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<
______
 MAINLINE Tc(MIN.) = 7.36
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.460
 SUBAREA LOSS RATE DATA(AMC III):
                   SCS SOIL
                           AREA
                                   Fp
  DEVELOPMENT TYPE/
                    GROUP (ACRES) (INCH/HR) (DECIMAL) CN
    LAND USE
                           1.55
                                   0.74
                                          0.100
 COMMERCIAL
                     Α
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
```

```
SUBAREA AREA(ACRES) = 1.SS SUBAREA RUNOFF(CFS) = 7.S1

EFFECTIVE AREA(ACRES) = 4.20 AREA-AVERAGED Fm(INCH/HR) = 0.07

AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) =
                 4.2
                            PEAK FLOW RATE(CFS) =
*****************
 FLOW PROCESS FROM NODE 103.00 TO NODE 104.00 IS CODE = 31
------
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
ELEVATION DATA: UPSTREAM(FEET) = 1371.54 DOWNSTREAM(FEET) = 1370.76
 FLOW LENGTH(FEET) = 26.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.05
                                 NUMBER OF PIPES = 1
 ESTIMATED PIPE DIAMETER(INCH) = 21.00
 PIPE-FLOW(CFS) = 20.36
 PIPE TRAVEL TIME(MIN.) = 0.03
                          Tc(MIN.) =
                                      7.39
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE
                                      104.00 =
                                                787.00 FEET.
*************************
 FLOW PROCESS FROM NODE 104.00 TO NODE 104.00 IS CODE = 81
 ......
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<
MAINLINE Tc(MIN.) = 7.39
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.445
 SUBAREA LOSS RATE DATA(AMC III):
                   SCS SOIL AREA
                                            Αp
  DEVELOPMENT TYPE/
                    GROUP (ACRES) (INCH/HR) (DECIMAL) CN
     LAND USE
                           1.05
                                  0.74
                     Α
                                           0.100
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 1.05 SUBAREA RUNOFF(CFS) = S.08
EFFECTIVE AREA(ACRES) = S.2S AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED AP = 0.10
                      5.2
                             PEAK FLOW RATE(CFS) =
 TOTAL AREA(ACRES) =
*************************
 FLOW PROCESS FROM NODE 104.00 TO NODE 113.00 IS CODE = 31
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
_______
 ELEVATION DATA: UPSTREAM(FEET) = 1370.76 DOWNSTREAM(FEET) = 1363.35
 FLOW LENGTH(FEET) = 247.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 15.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 13.59
 ESTIMATED PIPE DIAMETER(INCH) = 21.00
                                  NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 25.38
 PIPE TRAVEL TIME(MIN.) = 0.30
                           Tc(MIN.) =
                                      113.00 =
                                              1034.00 FEET.
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE
FLOW PROCESS FROM NODE 113.00 TO NODE 113.00 IS CODE = 1
 ------
  >>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE
TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 7.69
RAINFALL INTENSITY(INCH/HR) = 5.32
  AREA-AVERAGED fm(INCH/HR) = 0.07
  AREA-AVERAGED Fp(INCH/HR) = 0.74
  AREA-AVERAGED Ap = 0.10
                            5.25
  EFFECTIVE STREAM AREA(ACRES) =
  TOTAL STREAM AREA(ACRES) =
```

```
PEAK FLOW RATE(CFS) AT CONFLUENCE = 25.38
```

```
FLOW PROCESS FROM NODE 110.00 TO NODE 111.00 IS CODE = 21
-----
 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
______
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 495.00
 ELEVATION DATA: UPSTREAM(FEET) = 1381.19 DOWNSTREAM(FEET) = 1368.38
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = S.37S
 SUBAREA TC AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/
                  SCS SOIL AREA
                                   Fρ
                                                SCS
                                                    Tc
                   GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
     LAND USE
                           3.00
                                   0.74
                                          0.100
                                                 S2
 COMMERCIAL
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 14.31
                    3.00 PEAK FLOW RATE(CFS) =
 TOTAL AREA(ACRES) =
FLOW PROCESS FROM NODE 111.00 TO NODE 112.00 IS CODE = 31
------
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW) <<<<<
ELEVATION DATA: UPSTREAM(FEET) = 1364.38 DOWNSTREAM(FEET) = 1364.12
 FLOW LENGTH(FEET) = 33.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 21.0 INCH PIPE IS 16.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.04
 ESTIMATED PIPE DIAMETER(INCH) = 21.00
                                 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 14.31
                          Tc(MIN.) =
 PIPE TRAVEL TIME(MIN.) = 0.08
                                     7.63
 LONGEST FLOWPATH FROM NODE 110.00 TO NODE
                                     112.00 =
                                               S28.00 FEET.
*************************
 FLOW PROCESS FROM NODE 112.00 TO NODE 112.00 IS CODE = 81
>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<
MAINLINE Tc(MIN.) = 7.63
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = $.342
 SUBAREA LOSS RATE DATA(AMC III):
                   SCS SOIL AREA
                                   Fp
                                           Αp
  DEVELOPMENT TYPE/
                    GROUP (ACRES) (INCH/HR) (DECIMAL) CN
    LAND USE
                                  0.74
                                          0.100
                    Α
                           1.10
 COMMERCIAL
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 1.10 SUBAREA RUNOFF(CFS) = S.21 EFFECTIVE AREA(ACRES) = 4.10 AREA-AVERAGED Fm(INCH/HR) = 0.07 AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.10
                           PEAK FLOW RATE(CFS) =
 TOTAL AREA(ACRES) =
                     4.1
***********************
 FLOW PROCESS FROM NODE 112.00 TO NODE 113.00 IS CODE = 31
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<
__________
 ELEVATION DATA: UPSTREAM(FEET) = 1364.12 DOWNSTREAM(FEET) = 1361.59
 FLOW LENGTH(FEET) = 316.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 24.0 INCH PIPE IS 18.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.71
 ESTIMATED PIPE DIAMETER(INCH) = 24.00
                                 NUMBER OF PIPES = 1
```

```
PIPE-FLOW(CFS) =
               19.44
 PIPE TRAVEL TIME(MIN.) = 0.68 Tc(MIN.) =
                                       8.31
                                      113.00 =
 LONGEST FLOWPATH FROM NODE 110.00 TO NODE
***********************
 FLOW PROCESS FROM NODE 113.00 TO NODE 113.00 IS CODE = 1
......
 >>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<
TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.31
 RAINFALL INTENSITY(INCH/HR) = 5.07
 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.74
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) =
                             4.10
 TOTAL STREAM AREA(ACRES) = 4.10
                                 19.44
 PEAK FLOW RATE(CFS) AT CONFLUENCE =
 ** CONFLUENCE DATA **
                 Tc Intensity Fp(Fm)
                                             Ae
                                                  HEADWATER
                                       Αp
  STREAM
            Q
                (MIN.) (INCH/HR) (INCH/HR)
                                            (ACRES)
                                                    NODE
  NUMBER
           (CFS)
                       S.316 0.74( 0.07) 0.10
                                               5.2
                                                      100.00
                 7.69
           25.38
    1
                                                      110.00
                        S.074 0.74( 0.07) 0.10
                                               4.1
           19.44
                  8.31
    2
 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.
 ** PEAK FLOW RATE TABLE **
                                                  HEADWATER
                                             Ae
                Tc Intensity Fp(Fm)
  STREAM
            0
                (MIN.) (INCH/HR) (INCH/HR)
                                            (ACRES)
  NUMBER
           (CFS)
                                                      100.00
                        5.316 0.74( 0.07) 0.10
                                               9.0
    1
           44.23
                 7.69
                                               9.4
                                                      110.00
                        5.074 0.74( 0.07) 0.10
                 8.31
    2
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 44.23 Tc(MIN.) = 7.69
EFFECTIVE AREA(ACRES) = 9.04 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) =
                      9.4
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE
                                       113.00 =
************************
 FLOW PROCESS FROM NODE 113.00 TO NODE 114.00 IS CODE = 31
-----
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW) <<<<
ELEVATION DATA: UPSTREAM(FEET) = 1361.S9 DOWNSTREAM(FEET) = 1360.34
 FLOW LENGTH(FEET) = 1S6.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 9.51
                                  NUMBER OF PIPES = 1
 ESTIMATED PIPE DIAMETER(INCH) = 33.00
 PIPE-FLOW(CFS) = 44.23
 PIPE TRAVEL TIME(MIN.) = 0.27 Tc(MIN.) =
                                      7.97
  LONGEST FLOWPATH FROM NODE 100.00 TO NODE
                                      114.00 =
*****************************
 FLOW PROCESS FROM NODE 114.00 TO NODE 114.00 IS CODE = 81
        .....
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<
MAINLINE Tc(MIN.) = 7.97
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.20S
  SUBAREA LOSS RATE DATA(AMC III):
                                                   SCS
                                             Αp
  DEVELOPMENT TYPE/
                    SCS SOIL
                             AREA
                                     Fp
```

```
(ACRES) (INCH/HR) (DECIMAL) CN
     LAND USE
                    GROUP
                                  0.74
                           1.65
 COMMERCIAL
                    Α
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
                          SUBAREA RUNOFF(CFS) =
 SUBAREA AREA(ACRES) = 1.6S
 EFFECTIVE AREA(ACRES) = 10.69 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.10
                            PEAK FLOW RATE(CFS) =
 TOTAL AREA(ACRES) =
                    11.0
*********************
 FLOW PROCESS FROM NODE 114.00 TO NODE 115.00 IS CODE = 31
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
______
 ELEVATION DATA: UPSTREAM(FEET) = 1360.34 DOWNSTREAM(FEET) = 13S9.37
 FLOW LENGTH(FEET) = 324.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.78
                                NUMBER OF PIPES = 1
 ESTIMATED PIPE DIAMETER(INCH) = 42.00
 PIPE-FLOW(CFS) = 49.38
 PIPE TRAVEL TIME(MIN.) = 0.80
                          Tc(MIN.) =
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE
                                     115.00 = 1514.00 FEET.
**************************
 FLOW PROCESS FROM NODE 115.00 TO NODE 115.00 IS CODE = 81
......
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<
MAINLINE Tc(MIN.) = 8.76
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.916
 SUBAREA LOSS RATE DATA(AMC III):
                                                SCS
  DEVELOPMENT TYPE/
                           AREA
                                   Fp
                  SCS_SOTE
                   GROUP (ACRES) (INCH/HR) (DECIMAL) CN
     LAND USE
                                  0.74
                     Α
                            0.35
 COMMERCIAL
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 0.3S SUBAREA RUNOFF(CFS) =
 EFFECTIVE AREA(ACRES) = 11.04 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.10
                            PEAK FLOW RATE(CFS) =
                 11.4
 TOTAL AREA(ACRES) =
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
***********************
 FLOW PROCESS FROM NODE 115.00 TO NODE 122.00 IS CODE = 31
 ......
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW) <<<<
ELEVATION DATA: UPSTREAM(FEET) = 13S9.37 DOWNSTREAM(FEET) = 13S9.16
 FLOW LENGTH(FEET) = 68.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 42.0 INCH PIPE IS 29.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.87
 ESTIMATED PIPE DIAMETER(INCH) = 42.00
                                 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 49.38
 PIPE TRAVEL TIME(MIN.) = 0.16 Tc(MIN.) =
                                      8.93
                                     122.00 =
 LONGEST FLOWPATH FROM NODE
                       100.00 TO NODE
                                             1S82.00 FEET.
***********************
 FLOW PROCESS FROM NODE 122.00 TO NODE 122.00 IS CODE = 1
 -----
 >>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE
_______
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 8.93
 RAINFALL INTENSITY(INCH/HR) = 4.86
```

```
AREA-AVERAGED fp(INCH/HR) = 0.74
 AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) =
 TOTAL STREAM AREA(ACRES) = 11.3S
 PEAK FLOW RATE(CFS) AT CONFLUENCE =
                               49.38
FLOW PROCESS FROM NODE 120.00 TO NODE 121.00 IS CODE = 21
 .....
 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
INITIAL SUBAREA FLOW-LENGTH(FEET) = SS6.00
 ELEVATION DATA: UPSTREAM(FEET) = 1382.69 DOWNSTREAM(FEET) = 1375.18
 Tc = K^*[(LENGTH^{**} 3.00)/(ELEVATION CHANGE)]^{**}0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 9.011
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.834
 SUBAREA TC AND LOSS RATE DATA(AMC III):
                   SCS SOIL AREA
                                   Fp
  DEVELOPMENT TYPE/
                   GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
     LAND USE
                           6.10
                                 0.74
                                          0.100
 COMMERCIAL
                     Α
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) = 26.13
                    6.10 PEAK FLOW RATE(CFS) =
 TOTAL AREA(ACRES) =
*************************
 FLOW PROCESS FROM NODE 121.00 TO NODE 122.00 IS CODE = 31
 -----
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
ELEVATION DATA: UPSTREAM(FEET) = 1371.18 DOWNSTREAM(FEET) = 1359.16
 FLOW LENGTH(FEET) = 117.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 22.00
                                NUMBER OF PIPES = 1
 ESTIMATED PIPE DIAMETER(INCH) = 18.00
 PIPE-FLOW(CFS) =
                26.13
 PIPE TRAVEL TIME(MIN.) = 0.09
                          Tc(MIN.) =
                                      9.10
 LONGEST FLOWPATH FROM NODE 120.00 TO NODE
                                     122.00 =
FLOW PROCESS FROM NODE 122.00 TO NODE 122.00 IS CODE = 1
-----
  >>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES
TOTAL NUMBER OF STREAMS = 2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 9.10
  RAINFALL INTENSITY(INCH/HR) = 4.81
  AREA-AVERAGED Fm(INCH/HR) = 0.07
  AREA-AVERAGED Fp(INCH/HR) = 0.74
 AREA-AVERAGED Ap = 0.10
                       = 6.10
6.10
  EFFECTIVE STREAM AREA(ACRES) =
  TOTAL STREAM AREA(ACRES) =
  PEAK FLOW RATE(CFS) AT CONFLUENCE =
  ** CONFLUENCE DATA **
                 Tc Intensity Fp(Fm)
                                                HEADWATER
  STREAM
           0
                                          (ACRES)
           (CFS) (MIN.) (INCH/HR) (INCH/HR)
  NUMBER
                 8.93 4.862 0.74( 0.07) 0.10
                                            11.0
                                                   100.00
    1
           49.38
                                                   110.00
                                             11.4
                       4.668 0.74( 0.07) 0.10
           48.S3
                 9.SS
    1
                 9.10 4.806 0.74( 0.07) 0.10
                                             6.1
                                                   120.00
          26.13
```

AREA-AVERAGED Fm(INCH/HR) = 0.07

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO CONFLUENCE FORMULA USED FOR 2 STREAMS.

```
** PEAK FLOW RATE TABLE **
                                                  HEADWATER
                Tc Intensity Fp(Fm)
                                            Αe
 STREAM
           Q
                                           (ACRES)
                                                   NODE
               (MIN.) (INCH/HR) (INCH/HR)
          (CFS)
 NUMBER
                     4.862 0.74( 0.07) 0.10
                                                     100.00
                                             17.0
          75.32 8.93
                                                     120.00
          75.28
                 9.10
                       4.806 0.74( 0.07) 0.10
                                              17.2
    2
                9.55
                     4.668 0.74( 0.07) 0.10
                                              17.S
                                                     110.00
          73.90
    3
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 75.32 Tc(MIN.) = 8.93
EFFECTIVE AREA(ACRES) = 17.03 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED AP = 0.10
 TOTAL AREA(ACRES) = 17.5
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE
                                      122.00 =
******************************
 FLOW PROCESS FROM NODE 122.00 TO NODE 123.00 IS CODE = 31
-----
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
ELEVATION DATA: UPSTREAM(FEET) = 13S9.16 DOWNSTREAM(FEET) = 13S8.01
 FLOW LENGTH(FEET) = 4S4.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 38.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.93
                                 NUMBER OF PIPES = 1
 ESTIMATED PIPE DIAMETER(INCH) = 48.00
               75.32
 PIPE-FLOW(CFS) =
                          Tc(MIN.) =
 PIPE TRAVEL TIME(MIN.) = 1.09
                                      10.02
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE
                                      123.00 =
*********************
 FLOW PROCESS FROM NODE 123.00 TO NODE 123.00 IS CODE = 81
......
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<
MAINLINE Tc(MIN.) = 10.02
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.536
 SUBAREA LOSS RATE DATA(AMC III):
                                                  SCS
  DEVELOPMENT TYPE/ SCS SOIL AREA
                                    Fρ
                    GROUP (ACRES) (INCH/HR) (DECIMAL) CN
     LAND USE
                                           0.100
                      Α
                            2.50
                                   0.74
 COMMERCIAL
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 2.50 SUBAREA RUNOFF(CFS) =
 EFFECTIVE AREA(ACRES) = 19.S3 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.10
                                                   78.43
 TOTAL AREA(ACRES) =
                    20.0
                             PEAK FLOW RATE(CFS) =
*******************************
 FLOW PROCESS FROM NODE 123.00 TO NODE 303.00 IS CODE = 31
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
ELEVATION DATA: UPSTREAM(FEET) = 1358.01 DOWNSTREAM(FEET) = 1343.50
 FLOW LENGTH(FEET) = S90.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 16.68
 ESTIMATED PIPE DIAMETER(INCH) = 33.00
                                  NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 78.43
 PIPE TRAVEL TIME(MIN.) = 0.59 Tc(MIN.) =
                                      10.61
 LONGEST FLOWPATH FROM NODE 100.00 TO NODE
                                              2626.00 FEET.
                                      303.00 =
************************
                                  303.00 IS CODE = 10
 FLOW PROCESS FROM NODE 303.00 TO NODE
```

```
>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <
______
*************************
 FLOW PROCESS FROM NODE 200.00 TO NODE 201.00 IS CODE = 21
>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
______
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 635.00
 ELEVATION DATA: UPSTREAM(FEET) = 1390.64 DOWNSTREAM(FEET) = 1378.81
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.911
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.867
 SUBAREA TC AND LOSS RATE DATA(AMC III):
                                              SCS
                                                  Tc
                  SCS SOIL AREA
  DEVELOPMENT TYPE/
                         (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
                   GROUP
    LAND USE
                                        0.100
                                               S2
                          7.30
                                  0.74
                    Δ
 COMMERCIAL
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA RUNOFF(CFS) =
                   31.49
                   7.30 PEAK FLOW RATE(CFS) =
 TOTAL AREA(ACRES) =
************************
 FLOW PROCESS FROM NODE 201.00 TO NODE 202.00 IS CODE = 31
......
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
ELEVATION DATA: UPSTREAM(FEET) = 1374.81 DOWNSTREAM(FEET) = 1373.60
 FLOW LENGTH(FEET) = 242.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 7.38
                               NUMBER OF PIPES = 1
 ESTIMATED PIPE DIAMETER(INCH) = 33.00
 PIPE-FLOW(CFS) = 31.49
                         Tc(MIN.) =
 PIPE TRAVEL TIME(MIN.) = 0.SS
                                    9.46
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE
                                   202.00 =
                                             877.00 FEET.
***********************
 FLOW PROCESS FROM NODE 202.00 TO NODE 202.00 IS CODE = 81
      _____
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<
MAINLINE Tc(MIN.) = 9.46
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.696
 SUBAREA LOSS RATE DATA(AMC III):
                                              SCS
                                 Fp
                  SCS SOIL
                          ΔRFΔ
  DEVELOPMENT TYPE/
                   GROUP (ACRES) (INCH/HR) (DECIMAL) CN
     LAND USE
                                        0.100
                          2.85
                                 0.74
 COMMERCIAL
                    Α
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 2.8S SUBAREA RUNOFF(CFS) = 11.86
 EFFECTIVE AREA(ACRES) = 10.1S AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.10
                           PEAK FLOW RATE(CFS) =
 TOTAL AREA(ACRES) =
                    10.1
****************************
 FLOW PROCESS FROM NODE 202.00 TO NODE 203.00 IS CODE = 31
------
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<
  >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<
_______
 ELEVATION DATA: UPSTREAM(FEET) = 1373.60 DOWNSTREAM(FEET) = 1372.70
 FLOW LENGTH(FEET) = 180.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 25.4 INCHES
```

```
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.91
                                NUMBER OF PIPES = 1
 ESTIMATED PIPE DIAMETER(INCH) = 36.00
 PIPE-FLOW(CFS) = 42.22
 PIPE TRAVEL TIME(MIN.) = 0.38
                         Tc(MIN.) =
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE
                                    203.00 =
FLOW PROCESS FROM NODE 203.00 TO NODE 203.00 IS CODE = 81
_____
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<
______
 MAINLINE Tc(MIN.) = 9.84
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.587
 SUBAREA LOSS RATE DATA(AMC III):
                                                SCS
  DEVELOPMENT TYPE/
                 SCS SOIL
                          ΔRFA
                                  Fp
                   GROUP (ACRES) (INCH/HR) (DECIMAL) CN
     LAND USE
 COMMERCIAL
                                         0.100
                    Α
                           1.60
                                0.74
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 1.60 SUBAREA RUNOFF(CFS) = 6.50 EFFECTIVE AREA(ACRES) = 11.7S AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.10
                   11.8
                           PEAK FLOW RATE(CFS) =
 TOTAL AREA(ACRES) =
********************
 FLOW PROCESS FROM NODE 203.00 TO NODE 204.00 IS CODE = 31
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
ELEVATION DATA: UPSTREAM(FEET) = 1372.70 DOWNSTREAM(FEET) = 1370.73
 FLOW LENGTH(FEET) = 394.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 36.0 INCH PIPE IS 28.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 8.03
                                NUMBER OF PIPES = 1
 ESTIMATED PIPE DIAMETER(INCH) = 36.00
 PIPE-FLOW(CFS) =
              47.72
 PIPE TRAVEL TIME(MIN.) = 0.82
                         Tc(MIN.) =
                                    10.66
 LONGEST FLOWPATH FROM NODE
                       200.00 TO NODE
                                    204.00 =
                                             1451.00 FEET.
FLOW PROCESS FROM NODE 204.00 TO NODE 204.00 IS CODE = 81
______
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<
MAINLINE Tc(MIN.) = 10.66
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.372
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/ SCS SOIL
                          AREA
                                  Fp
                   GROUP (ACRES) (INCH/HR)
                                        (DECIMAL) CN
    LAND USE
                                  0.74
                           1.85
 COMMERCIAL
                    Α
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
                         SUBAREA RUNOFF(CFS) =
 SUBAREA AREA(ACRES) = 1.85
 EFFECTIVE AREA(ACRES) = 13.60 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.10
                            PEAK FLOW RATE(CFS) =
 TOTAL AREA(ACRES) =
                    13.6
*************************
 FLOW PROCESS FROM NODE 204.00 TO NODE 302.00 IS CODE = 1
 ......
 >>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE
TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 10.66
RAINFALL INTENSITY(INCH/HR) = 4.37
 AREA-AVERAGED Fm(INCH/HR) = 0.07
```

```
AREA-AVERAGED Ap = 0.10
 EFFECTIVE STREAM AREA(ACRES) =
                              13.60
 TOTAL STREAM AREA(ACRES) = 13.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =
                                  S2.61
************************
 FLOW PROCESS FROM NODE 300.00 TO NODE 301.00 IS CODE = 21
-----
 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
INITIAL SUBAREA FLOW-LENGTH(FEET) = 908.00
 ELEVATION DATA: UPSTREAM(FEET) = 1368.06 DOWNSTREAM(FEET) = 1363.S2
 Tc = K^*[(LENGTH^{**} 3.00)/(ELEVATION CHANGE)]^{**}0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.376
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.814
 SUBAREA TC AND LOSS RATE DATA(AMC III):
                                                    SCS
                    SCS SOIL AREA
                                              Αp
                                                        Tc
  DEVELOPMENT TYPE/
                                     Fp
                    GROUP (ACRES) (INCH/HR) (DECIMAL) CN (MIN.)
     LAND USE
                      Α
                            7.45 0.74
                                            0.100
                                                    52 13.38
 COMMERCIAL
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
                     25.08
 SUBAREA RUNOFF(CFS) =
                     7.4S PEAK FLOW RATE(CFS) =
 TOTAL AREA(ACRES) =
************************
 FLOW PROCESS FROM NODE 301.00 TO NODE 302.00 IS CODE = 31
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
ELEVATION DATA: UPSTREAM(FEET) = 13S9.S2 DOWNSTREAM(FEET) = 13S8.98
 FLOW LENGTH(FEET) = 107.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 6.99
 ESTIMATED PIPE DIAMETER(INCH) = 30.00
                                   NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) =
                25.08
 PIPE TRAVEL TIME(MIN.) = 0.26
                            Tc(MIN.) =
                                                 1015.00 FEET.
 LONGEST FLOWPATH FROM NODE 300.00 TO NODE
                                        302.00 =
*****************
 FLOW PROCESS FROM NODE 302.00 TO NODE 302.00 IS CODE = 1
 >>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE
 >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES
TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 13.63
RAINFALL INTENSITY(INCH/HR) = 3.77
 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.74
 AREA-AVERAGED Ap = 0.10
  EFFECTIVE STREAM AREA(ACRES) =
 TOTAL STREAM AREA(ACRES) = 7.4S
  PEAK FLOW RATE(CFS) AT CONFLUENCE =
  ** CONFLUENCE DATA **
                 Tc Intensity Fp(Fm)
                                              Αe
                                                    HEADWATER
                                         Αр
  STREAM
           (CFS) (MIN.) (INCH/HR) (INCH/HR)
                                             (ACRES)
                                                      NODE
  NUMBER
                                             13.6
                10.66 4.372 0.74( 0.07) 0.10
                                                       200.00
           S2.61
     1
           25.08 13.63 3.771 0.74( 0.07) 0.10
                                                 7.4
                                                       300.00
  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
```

CONFLUENCE FORMULA USED FOR 2 STREAMS.

AREA-AVERAGED Fp(INCH/HR) = 0.74

```
** PEAK FLOW RATE TABLE **
                                                       HEADWATER
                                                 Ae ·
  STREAM
             Q
                   Tc Intensity Fp(Fm)
                  (MIN.) (INCH/HR) (INCH/HR)
                                                (ACRES)
  NUMBER
            (CFS)
                          4.372 0.74( 0.07) 0.10
                                                           200.00
                                                   19.4
            75.39
                  10.66
    1
                          3.771 0.74( 0.07) 0.10
                                                   21.0
                                                           300.00
                 13.63
    2
           70.33
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 7S.39 Tc(MIN.) = 10.66
EFFECTIVE AREA(ACRES) = 19.42 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 21.0
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE
                                           302.00 =
                                                     1451.00 FEET.
*************************
 FLOW PROCESS FROM NODE 302.00 TO NODE 303.00 IS CODE = 31
......
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)
ELEVATION DATA: UPSTREAM(FEET) = 13S8.98 DOWNSTREAM(FEET) = 1343.50
 FLOW LENGTH(FEET) = 247.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 23.38
                                     NUMBER OF PIPES = 1
 ESTIMATED PIPE DIAMETER(INCH) = 27.00
 PIPE-FLOW(CFS) = 75.39
                              Tc(MIN.) =
 PIPE TRAVEL TIME(MIN.) = 0.18
                                          10.83
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE
                                          303.00 =
                                                    1698.00 FEET.
************************
 FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 11
 ......
 >>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY
** MAIN STREAM CONFLUENCE DATA **
                                                       HEADWATER
                  Tc Intensity Fp(Fm)
                                                 Ae
  STREAM
             0
                                                (ACRES)
                                                         NODE
            (CFS) (MIN.) (INCH/HR) (INCH/HR)
  NUMBER
                                                19.4
                        4.329 0.74( 0.07) 0.10
3.742 0.74( 0.07) 0.10
            75.39 10.83
70.33 13.81
                                                           200.00
    1
                                                   21.0
                                                           300.00
 LONGEST FLOWPATH FROM NODE 200.00 TO NODE
                                         303.00 =
                                                   1698.00 FEET.
 ** MEMORY BANK # 1 CONFLUENCE DATA **
                                                       HEADWATER
                   Tc Intensity Fp(Fm)
                                                 Ae
  STREAM
             Q
            (CFS) (MIN.) (INCH/HR) (INCH/HR)
                                                (ACRES)
  NUMBER
                 10.61 4.383 0.74( 0.07) 0.10
                                                   19.5
                                                           100.00
    1
                 10.78
                         4.341 0.74(0.07) 0.10
4.235 0.74(0.07) 0.10
                                                   19.7
                                                           120.00
     2
            78.41
                                                           110.00
                                                   20.0
            77.22
                  11.24
     3
                         100.00 TO NODE
                                         303.00 = 2626.00 FEET.
 LONGEST FLOWPATH FROM NODE
 ** PEAK FLOW RATE TABLE **
                                                        HEADWATER
            Q
                  Tc Intensity Fp(Fm)
                                                 Ae
  STREAM
                  (MIN.) (INCH/HR) (INCH/HR)
                                                (ACRES)
  NUMBER
            (CFS)
           153.21
                         4.383 0.74( 0.07) 0.10
                                                   38.6
                                                           100.00
                 10.61
     1
                          4.341 0.74( 0.07) 0.10
                                                   39.1
                                                           120.00
                  10.78
                          4.329 0.74( 0.07) 0.10
                                                   39.2
                                                           200.00
           153.67
                  10.83
     3
                          4.235 0.74( 0.07) 0.10
                                                   39.6
                                                           110.00
                  11.24
           151.92
           138.40 13.81
                          3.742 0.74( 0.07) 0.10
                                                   41.0
                                                           300.00
   TOTAL AREA(ACRES) =
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 1S3.67 Tc(MIN.) = 10.831
EFFECTIVE AREA(ACRES) = 39.18 AREA-AVERAGED Fm(INCH/HR) = 0.07
 AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.10
  TOTAL AREA(ACRES) = 41.0
                          100.00 TO NODE
                                           303.00 = 2626.00 FEET.
  LONGEST FLOWPATH FROM NODE
```

```
*************************
 FLOW PROCESS FROM NODE 303.00 TO NODE 303.00 IS CODE = 12
 >>>>CLEAR MEMORY BANK # 1 <<<<<
***********************
 FLOW PROCESS FROM NODE 303.00 TO NODE 304.00 IS CODE = 31
......
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW) <<<<<
______________________________
 ELEVATION DATA: UPSTREAM(FEET) = 1343.50 DOWNSTREAM(FEET) = 1342.25
 FLOW LENGTH(FEET) = 98.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 48.0 INCH PIPE IS 35.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 15.43
                               NUMBER OF PIPES = 1
 ESTIMATED PIPE DIAMETER(INCH) = 48.00
 PIPE-FLOW(CFS) = 1S3.67
 PIPE TRAVEL TIME(MIN.) = 0.11 Tc(MIN.) =
                                    10.94
                     100.00 TO NODE
                                             2724.00 FEET.
 LONGEST FLOWPATH FROM NODE
****************************
 FLOW PROCESS FROM NODE 304.00 TO NODE 304.00 IS CODE = 81
______
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<
______
 MAINLINE Tc(MIN.) = 10.94
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.304
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/ SCS SOIL AREA
                                  Fρ
                  GROUP (ACRES) (INCH/HR) (DECIMAL) CN
     LAND USE
                          1.00
                                  0.74
                                         0.100
                    Α
 COMMERCIAL
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
 SUBAREA AREA(ACRES) = 1.00 SUBAREA RUNOFF(CFS) = 3.81

EFFECTIVE AREA(ACRES) = 40.18 AREA-AVERAGED Fm(INCH/HR) = 0.07

AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.10

TOTAL AREA(ACRES) = 42.0 PEAK FLOW RATE(CFS) = 153.67
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
**********************
 FLOW PROCESS FROM NODE 304.00 TO NODE 305.00 IS CODE = 31
______
 >>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<
 >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<
ELEVATION DATA: UPSTREAM(FEET) = 1342.2S DOWNSTREAM(FEET) = 1341.84
 FLOW LENGTH(FEET) = 22.00 MANNING'S N = 0.012
 DEPTH OF FLOW IN 4S.0 INCH PIPE IS 32.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 17.82
                                NUMBER OF PIPES = 1
 ESTIMATED PIPE DIAMETER(INCH) = 45.00
               153.67
 PIPE-FLOW(CFS) =
 PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) =
                                             2746.00 FEET.
 LONGEST FLOWPATH FROM NODE
                      100.00 TO NODE
FLOW PROCESS FROM NODE 305.00 TO NODE 305.00 IS CODE = 81
    ------
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<
MAINLINE Tc(MIN.) = 10.96
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.299
 SUBAREA LOSS RATE DATA(AMC III):
                                               SCS
                 SCS SOIL AREA
                                  Fp
                                          Αp
  DEVELOPMENT TYPE/
                   GROUP (ACRES) (INCH/HR) (DECIMAL) CN
     LAND USE
                                         0.100
                                  0.74
 COMMERCIAL
                     Α
                           5.00
 NATURAL FAIR COVER
```

```
100P.RES
                                0.55
                                         0.55
                                               1.000
                                                        66
 "OPEN BRUSH"
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.64
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.189
                               SUBAREA RUNOFF(CFS) =
                                                   20.87
                     s.ss
 SUBAREA AREA(ACRES) =
 EFFECTIVE AREA(ACRES) =
                       4S.73 AREA-AVERAGED Fm(INCH/HR) = 0.08
 AREA-AVERAGED Fp(INCH/HR) = 0.72 AREA-AVERAGED AP = 0.11
                                                        173.64
                       47.S
                                 PEAK FLOW RATE(CFS) =
 TOTAL AREA(ACRES) =
 ** PEAK FLOW RATE TABLE **
                                                        HEADWATER
  STREAM
             Q
                   Tc Intensity
                                  Fp(Fm)
                                           Αр
                                                  Ae
                 (MIN.) (INCH/HR) (INCH/HR)
                                                (ACRES)
                                                         NODE
           (CFS)
  NUMBER
                                                   45.1
                                                           100.00
                          4.352 0.72( 0.08) 0.11
                  10.74
          173.43
    1
                                                   45.6
                                                           120.00
          173.69
                  10.91
                          4.311 0.72( 0.08) 0.11
    2
                                                           200.00
                          4.299 0.72( 0.08) 0.11
                                                   45.7
                  10.96
          173.64
    3
                          4.207 0.72( 0.08) 0.11
                                                           110.00
                                                   46.1
                  11.36
    4
          171.39
                                                           300.00
                 13.94
                          3.721 0.72( 0.08) 0.11
                                                   47.S
          155.84
    S
 NEW PEAK FLOW DATA ARE:
                       173.69 Tc(MIN.) = 10.91
 PEAK FLOW RATE(CFS) =
 AREA-AVERAGED Fm(INCH/HR) = 0.08 AREA-AVERAGED Fp(INCH/HR) = 0.72
 AREA-AVERAGED Ap = 0.11 EFFECTIVE AREA(ACRES) =
                                                 45.61
END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)
                           47.S TC(MIN.) =
                                             10.91
                        4S.61 AREA-AVERAGED Fm(INCH/HR)= 0.08
 EFFECTIVE AREA(ACRES) =
 AREA-AVERAGED Fp(INCH/HR) = 0.72 AREA-AVERAGED Ap = 0.111
                         173.69
 PEAK FLOW RATE(CFS)
 ** PEAK FLOW RATE TABLE **
                                                       HEADWATER
                   Tc Intensity Fp(Fm)
                                                  Ae
  STREAM
                  (MIN.) (INCH/HR) (INCH/HR)
                                                (ACRES)
                                                         NODE
  NUMBER
            (CFS)
                          4.352 0.72( 0.08) 0.11
4.311 0.72( 0.08) 0.11
                                                           100.00
                                                   45.1
          173.43
                  10.74
    1
                                                   45.6
                                                           120.00
                  10.91
           173.69
                                                           200.00
                          4.299 0.72( 0.08) 0.11
                                                   45.7
          173.64
                  10.96
     3
                          4.207 0.72( 0.08) 0.11
                                                   46.1
                                                           110.00
          171.39
                  11.36
                                                   47.S
                                                           300.00
          155.84
                  13.94
                          3.721 0.72( 0.08) 0.11
     5
______
```

END OF RATIONAL METHOD ANALYSIS

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********************
         RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
       (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
       (c) Copyright 1983-2016 Advanced Engineering Software (aes)
          Ver. 23.0 Release Date: 07/01/2016 License ID 1435
                    Analysis prepared by:
                   THIENES ENGINEERING, INC.
                     14349 FIRESTONE BLVD
                     LA MIRADA, CA 90638
                        714-S21-4811
* TET TOR NO 36S1
* 100-YEAR PROPOSED EVENT
* PROPOSED CONDITION (NODES 400-401)
*******************
 FILE NAME: W:\36S1\PRELIM\400P.DAT
 TIME/DATE OF STUDY: 08:04 01/14/2020
USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--*TIME-OF-CONCENTRATION MODEL*--
 USER SPECIFIED STORM EVENT(YEAR) = 100.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.9S
 *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
 SLOPE OF INTENSITY DURATION CURVE(LOG(I; IN/HR) vs. LOG(Tc; MIN)) = 0.6000
 USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.5500
 *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
    HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
    WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
                 SIDE / SIDE/ WAY
                               (FT)
                                     (FT) (FT) (FT)
          (FT)
    (FT)
         --- ----
           20.0 0.018/0.018/0.020
                                0.67
                                       2.00 0.0312 0.167 0.0150
   30.0
 GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
   1. Relative Flow-Depth = 0.00 FEET
     as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
   2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED
*************************
  FLOW PROCESS FROM NODE 400.00 TO NODE 401.00 IS CODE = 21
 ------
  >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 169.00
  ELEVATION DATA: UPSTREAM(FEET) = 1372.14 DOWNSTREAM(FEET) = 1351.71
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.884
  SUBAREA TC AND LOSS RATE DATA(AMC III):
                                                 SCS
                                                      Tc
```

SCS SOIL AREA

0.25

Α

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74

DEVELOPMENT TYPE/

LAND USE

COMMERCIAL

Αp

0.100

(MIN.)

5.00

Fp

GROUP (ACRES) (INCH/HR) (DECIMAL) CN

0.74

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA RUNOFF(CFS) = 1.53
TOTAL AREA(ACRES) = 0.25 PEAK FLOW RATE(CFS) = 1.53

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 0.2 TC(MIN.) = 5.00

EFFECTIVE AREA(ACRES) = 0.25 AREA-AVERAGED FM(INCH/HR) = 0.07

AREA-AVERAGED FP(INCH/HR) = 0.74 AREA-AVERAGED AP = 0.100

PEAK FLOW RATE(CFS) = 1.53

_______ -----

END OF RATIONAL METHOD ANALYSIS

•

```
S00P.RES
******************
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                     Analysis prepared by:
                    THIENES ENGINEERING, INC.
                      14349 FIRESTONE BLVD
                      LA MIRADA, CA 9063B
                         714-521-4811
* TEI JOB NO 36S1
* 100-YEAR STORM EVENT
 PROPOSED CONDITION (NODES S00-S01)
 FILE NAME: W:\36S1\PRELIM\S00P.DAT
 TIME/DATE OF STUDY: 0B:09 01/14/2020
______
 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--*TIME-OF-CONCENTRATION MODEL*--
 USER SPECIFIED STORM EVENT(YEAR) = 100.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
 SPECIFIED PERCENT OF GRADIENTS (DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
 *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
 SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
 USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.SS00
 *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*
 *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
    HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING
    WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
                  SIDE / SIDE/ WAY
                                 (FT)
                                        (FT) (FT) (FT)
           (FT)
NO.
    (FT)
        -----
                                       ----- ----- ----- -----
--- ----
                                        2.00 0.0312 0.167 0.0150
           20.0 0.018/0.018/0.020 0.67
 1 30.0
 GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
   1. Relative Flow-Depth = 0.00 FEET
     as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
   2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
 *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED
**************************
 FLOW PROCESS FROM NODE S00.00 TO NODE S01.00 IS CODE = 21
 ......
 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
________
 INITIAL SUBAREA FLOW-LENGTH(FEET) = 269.00
 ELEVATION DATA: UPSTREAM(FEET) = 136S.27 DOWNSTREAM(FEET) = 13S2.3B
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.699
 SUBAREA TC AND LOSS RATE DATA(AMC III):
```

SCS SOIL AREA

GROUP

Α SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74

(ACRES)

0.70

DEVELOPMENT TYPE/

LAND USE

COMMERCIAL

Fp

(INCH/HR)

0.74

ДD

0.100

(DECIMAL) CN

SCS

S2

Tc

(MIN.)

5.23

S00P.RES

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100

SUBAREA RUNOFF(CFS) = 4.17

TOTAL AREA(ACRES) = 0.70 PEAK FLOW RATE(CFS) = 4.17

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 0.7 TC(MIN.) = 5.23

EFFECTIVE AREA(ACRES) = 0.70 AREA-AVERAGED Fm(INCH/HR) = 0.07

AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.100

PEAK FLOW RATE(CFS) = 4.17

END OF RATIONAL METHOD ANALYSIS

```
600P.RES
***********************
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                     Analysis prepared by:
                   THIENES ENGINEERING, INC.
                      14349 FIRESTONE BLVD
                      LA MIRADA, CA 90638
                         714-S21-4811
* TEI JOB NO 36S1
* 100 YEAR STORM EVENT
 PROPOSED CONDITION SOUTHERN LANDSCAPE BUFFER
```

FILE NAME: W:\36S1\PRELIM\600P.DAT TIME/DATE OF STUDY: 13:3S 01/21/2020

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00 SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95 *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000 USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.5500

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL HALF- CROWN TO STREET-CROSSFALL: CURB GUTTER-GEOMETRIES: MANNING WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR SIDE / SIDE/ WAY (FT) (FT) (FT) (FT) (n) NO. (FT) (FT) ---------------20.0 0.018/0.018/0.020 0.67 2.00 0.0312 0.167 0.0150 30.0

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET

as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)

2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN

OR FOUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************** FLOW PROCESS FROM NODE 600.00 TO NODE 601.00 IS CODE = 22

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<

>>>>USE SPECIFIED TC VALUE FOR INITIAL SUBAREA<<<

USER SPECIFIED Tc(MIN.) = 5.000 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.884

SUBAREA LOSS RATE DATA(AMC III):

SCS DEVELOPMENT TYPE/ SCS SOIL ΔRFΔ Fρ GROUP (ACRES) (INCH/HR) (DECIMAL) CN LAND USE 1.35 0.74 0.850 PUBLIC PARK SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850

SUBAREA RUNOFF(CFS) = 7.60

TOTAL AREA(ACRES) = 1.35 PEAK FLOW RATE(CFS) = 7.60 ______ END OF STUDY SUMMARY: TOTAL AREA(ACRES) = 1.4 TC(MIN.) = 5.00

EFFECTIVE AREA(ACRES) = 1.35 AREA-AVERAGED Fm(INCH/HR) = 0.63

AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.850

PEAK FLOW RATE(CFS) = 7.60 _______

END OF RATIONAL METHOD ANALYSIS

```
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```

Analysis prepared by:

THIENES ENGINEERING, INC. 14349 FIRESTONE BLVD LA MIRADA, CA 90638 714-521-4811

```
************************* DESCRIPTION OF STUDY *********************
* TEI JOB NO 3651
 100 YEAR STORM EVENT
 PROPOSED CONDITION EASTERN LANDSCAPE BUFFER
 FILE NAME: W:\36S1\PRELIM\700P.DAT
 TIME/DATE OF STUDY: 13:37 01/21/2020
______
 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--*TIME-OF-CONCENTRATION MODEL*--
 USER SPECIFIED STORM EVENT(YEAR) = 100.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
 *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
 SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
 USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.5500
 *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*
 *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
    HALF- CROWN TO STREET-CROSSFALL:
                                   CURB GUTTER-GEOMETRIES: MANNING
    WIDTH CROSSFALL IN- / OUT-/PARK- HEIGHT WIDTH LIP HIKE FACTOR
                                          (FT) (FT) (FT)
            (FT)
                   SIDE / SIDE/ WAY
                                   (FT)
NO.
    (FT)
          ------
                                         -----
--- ----
            20.0 0.018/0.018/0.020 0.67
                                          2.00 0.0312 0.167 0.0150
    30.0
 GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
   1. Relative Flow-Depth = 0.00 FEET
     as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
   2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)
 *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
  OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
 *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED
*********************
 FLOW PROCESS FROM NODE 700.00 TO NODE
                                      701.00 IS CODE = 22
 >>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<
 >>>>USE SPECIFIED To VALUE FOR INITIAL SUBAREA
______
 USER SPECIFIED Tc(MIN.) =
                         5.000
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) = 6.884
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/
                     SCS_SOTE
                               AREA
                      GROUP (ACRES) (INCH/HR) (DECIMAL) CN
                               0.35
                                       0.74
                                               0.850
 PUBLIC PARK
                       Λ
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.850
 SUBAREA RUNOFF(CFS) =
                        1.97
```

TOTAL AREA(ACRES) = 0.35 PEAK FLOW RATE(CFS) = 1.97

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 0.3 TC(MIN.) = 5.00

EFFECTIVE AREA(ACRES) = 0.3S AREA-AVERAGED Fm(INCH/HR) = 0.63

AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.850

PEAK FLOW RATE(CFS) = 1.97

END OF RATIONAL METHOD ANALYSIS

Page 2

APPENDIX C

HYDROLOGY MAPS

